DRAFT ECONOMIC IMPACT ANALYSIS OF PROPOSED CRITICAL HABITAT FOR THREATENED AND ENDANGERED PLANTS ON LANA'I

REVISED DETERMINATIONS

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PREFACE

The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ('Regulatory Planning and Review'), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

> *'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'*

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by federal landowners, federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In New Mexico Cattle Growers Ass'n v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis incorporates two baselines. One addresses the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the upper bounds of the cost of project modifications based on the benefits and economic costs of project modifications that would be required due to consultation under the jeopardy standard. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

"The other baseline, the lower boundary baseline, will be a more traditional rulemaking baseline. It will attempt to provide the Service's best analysis of which of the effects of future consultations actually result from the regulatory action under review - i.e. the critical habitat designation. These costs will in most cases be the costs of additional consultations, reinitiated consultations, and additional project modifications that would not have been required under the jeopardy standard alone as well as costs resulting from uncertainty and perceptional impacts on markets."

DATED: March 20, 2002

FOREWORD

1. CONTENT AND PURPOSE

This report assesses the economic impacts that may result from the designation of critical habitat for threatened and endangered plant species on the islands of Lana'i in the State of Hawai'i. It was prepared for the U.S. Fish and Wildlife Service (the Service) to help them in their decision regarding designating critical habitat for the plant species.

As required by the Endangered Species Act, as amended (the Act), the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. If the economic analysis reveals that the economic impacts of designating any area as critical habitat outweigh the benefits of designation, then the Service may exclude the area from consideration, unless excluding the area will result in the extinction of the species.

The focus of the economic analysis is on section 7(a)(2) of the Act which requires consultation with the Service and possible project modification for certain projects and activities that may affect a species listed as threatened or endangered, or the designated critical habitat of a listed species. The consultations and possible project modifications will have economic impacts which, in this report, are referred to as "section 7 economic impacts" to distinguish them from the economic impacts related to other sections of the Act. Economic impacts that result from other sections of the Act are outside the scope of this economic analysis because only section 7 (a)(2) speaks to the role of critical habitat.

2. ORGANIZATION

This report is organized into six chapters:

— Chapter I: The Listed Plants and Proposed Critical Habitat

This chapter provides relevant information on the plant species and the proposed critical habitat units.

— Chapter II: Physical and Socioeconomic Profile of Maui County

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents a physical description of Lana'i and the socioeconomic profile of Maui County.

— Chapter III: The Endangered Species Act

Relevant information from the Act is presented in Chapter III, including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service, and the definition of taking and other restrictions.

— Chapter IV: Existing Protections

This chapter presents information on existing regulations and land management policies that protect wildlife species or their habitats.

— Chapter V: Approach to the Economic Impact Analysis

This chapter gives the general approach used to estimate section 7 economic impacts of the species listing and the critical habitat designation.

— Chapter VI: Economic Costs and Benefits

This chapter discusses planned projects, activities and land uses in the proposed critical habitat units and estimates section 7 economic costs and benefits. This chapter also identifies the effects which can be attributable solely to the critical-habitat provisions of section 7.

After learning about the proposed critical habitat (Chapter I), readers who are already familiar with Maui County (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the approach to conducting the economic analysis (Chapter V) may wish to skip these chapters, as appropriate, and proceed to the economic analysis (Chapter VI).

3. TERMINOLOGY

The following Service terminology is *italicized* throughout this document for the benefit of readers who are unfamiliar with it and want to be reminded that the Service has given specific meanings to these words and terms: *Federal involvement, Federal nexus, occupied, unoccupied*, *primary constituent elements, jeopardy, adverse modification,* and *take.* The terms are explained in the body of the report.

4. ECONOMIC CONSULTANTS

Most of the analysis was performed by Industrial Economics, Inc. (IEc), an economic consulting firm in Cambridge, Massachusetts. In conducting the analysis, IEc staff worked in Hawai'i with the Service and with Hawai'i government agencies, companies, and organizations listed in the References. Decision Analysts Hawai'i, Inc. (DAHI)–a Hawai'i based economic consulting firm under subcontract to IEc–conducted similar analyses for other species in Hawai'i and provided advice and assistance to IEc on this report.

EXECUTIVE SUMMARY

1. INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts that would result from the proposed critical habitat designation for the threatened and endangered plant species from Lana'i. Section 4(b)(2) of the Endangered Species Act (the Act) requires the Service to designate critical habitat on the basis of the best scientific and commercial data available after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

The focus of this economic analysis is on section 7(a)(2) of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out by the Federal government is not likely to *jeopardize* the continued existence of any endangered or threatened species or result in the destruction or *adverse modification* of critical habitat. Federal agencies are required to consult with the Service whenever they propose a discretionary action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection that apply directly to lands designated as critical habitat. Because consultation under section 7 only applies to activities that involve Federal permits, funding or involvement, the designation of critical habitat will not afford any additional protections under the Act with respect to strictly private activities. This analysis does not address impacts associated with implementation of other sections of the Act.

2. PROPOSED CRITICAL HABITAT DESIGNATION

The Service is proposing eight critical habitat units for 32 threatened and endangered plants in Lana'i. Combined, these units cover 19,405 acres.[1] The largest proposed critical habitat (Unit D) encompasses the mountain summit of Lana'i, while five much smaller units are scattered along the mountain flanks or old agricultural planes. Of the two remaining units, one is on the south shore and the other on Po'opo'o islet off the south shore.

[1]This acreage estimate overstates the actual critical habitat acreage, because it includes "unmapped holes", including development at Manele Bay and the existing manmade features and structures discussed in Chapter I, Section 2.b.

3. ECONOMIC IMPACTS

For the most part, implementation of the section 7 listing and critical habitat provisions of the Act on the areas proposed for critical habitat would have minor economic impacts for the following reasons:

— As modified[2], none of the units contains significant military, residential, commercial, industrial, or golf-course projects; crop farming; or intensive livestock operations. Furthermore, over the next ten years, few projects are planned for locations in the proposed critical habitat. This situation reflects the fact that (1) most of the land is unsuitable for development or other economic activities due to the rugged terrain, lack of access, and remote locations; and (2) most of the land proposed for critical habitat is in the State Conservation District where development and most other economic activities are severely limited.

— Some existing and continuing activities involve the operation and maintenance of existing man-made features and structures. These are not subject to the critical habitat provisions of section 7 because they do not contain the *primary constituent elements* for the plants, and therefore would not be impacted by the designation.

— Some existing and planned projects, land uses, and activities that could affect the proposed critical habitat units have no *Federal involvement* that would require section 7 consultation with the Service, so they are not restricted by the requirements of the Act.

— For the anticipated projects and activities that will have *Federal involvement,* many are conservation efforts that will not negatively impact the plants or their habitat and many have already been consulted prior to the proposed designation, so they will be subject to the minimal level of reinitiation of section 7 consultation.

For various economic activities in the proposed critical habitat, Table ES-1 presents estimates of (1) the total direct and indirect costs and benefits attributable to the section 7 provisions

[2]The Service has indicated that the final rule for the critical habitat will feature (1) remapped boundaries that exclude large areas which do not contain *primary constituent elements*, and (2) an expanded list of manmade features and structures that do not contain *primary constituent elements* (Memorandum to the Service, Washington Office, from the Service, Honolulu Field Office. March 21, 2002).

of the Act that are associated with listing the plants as threatened and endangered species *and* with designating critical habitat for the plants, and (2) that portion of the total costs and benefits which are estimated to be solely attributable to the critical habitat designation.

Over a 10-year time period, the total estimated section 7-related cost associated with the plants species listings and critical habitat designation, including the indirect costs to investigate the implications of critical habitat, is approximately $2.5 million while the cost attributable solely to the critical habitat designation is approximately $2.2 million. The costs represent less than 0.1 percent of the Maui County's total personal income for 1999. In addition, indirect costs could add $4.8 million or more to the totals.

Designation of the proposed critical habitat and related actions taken to control threats to the plant species (e.g., ungulate control) may also generate economic benefits. These benefits may be related directly or indirectly to designation and manifest in increased regional economic activity or social welfare. For the former, to the extent that critical habitat designation leads to additional conservation management activities funded by out-of-state sources, a local increase in revenues and employment may result. For the latter, species preservation and recovery and other complementary ecological improvements may generate social welfare benefits for residents and non-residents alike. However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Lana'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms.

Table ES-1
Section 7-Related Costs and Benefits Attributable to the Plant Listing and Critical Habitat
(10 year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS					
Management of Game Hunting					
State-Managed Lands, Consultations	$ 30,000	$ 30,000	$ 28,000	$ 28,000	Consultation due to Pittman-Robertson funding.
State-Managed Lands, PMs	$ 2,400,000	$ 2,400,000	$ 2,100,000	$ 2,100,000	PMs could include constructing exclosure fences around the proposed CH.
Conservation Projects					
The Partners for Fish and Wildlife Programs/ Wildlife Habitat Incentive Program, Reinitiation of Consultations	$ 10,400	$ 10,400	$ 10,400	$ 10,400	Reinitiation of consultations likely due to the Service's funding.
The Partners for Fish and Wildlife Programs/ Wildlife Habitat Incentive Program, PM	None	None	None	None	
U.S. Military Activities					
Aviation Training, Consultations	$ 3,800	$ 3,800	$ 3,800	$ 3,800	Reinitiation of consultation likely due to activities being carried out by a Federal agency.
Aviation Training, PMs	None	None	None	None	
Civil Works Program					
Kaumalapau Harbor Project, Consultations	$ 14,000	$ 14,000	$ 14,000	$ 14,000	Consultation due to activities being carried out by a Federal agency.
Kaumalapau Harbor Project, PMs	Minor	Minor	Minor	Minor	

Table ES-1
Section 7-Related Costs and Benefits Attributable to the Plant Listing and Critical Habitat
(continued)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
INDIRECT COSTS					
Management of Game Mammals and Loss of Hunting Lands	Minor	Minor	Minor	Minor	Slight probability of a major impact.
Conservation Management	Minor	Minor	Minor	Minor	No obligation to proactively manage lands to control threats, but an undetermined probability of a major impact.
State and County Development Approvals	Major	Major	Major	Major	New quarry project may be affected.
Reduced Property Values	Major	Major	Major	Major	Rural lands may be affected.
Investigate Implications of CH	$ 2,700	$ 6,500	$ 2,700	$ 6,500	The private landowner may investigate the implications of CH on his land.
Reduced Cooperation on Conservation Projects	Modest	Modest	Modest	Modest	
DIRECT SECTION 7 BENEFITS					
Benefits of Project Modifications	ne	ne	ne	ne	Difficult to estimate ecological effects of PMs and their value.
Benefits to Developers	Minor	Minor	Minor	Minor	Helps developers site projects.
Ecotourism	Minor	Minor	Minor	Minor	The Service prefers that guides do not feature visits to endangered plants.
INDIRECT BENEFITS					
Species Preservation	ne	ne	ne	ne	Difficult to estimate preservation benefits and their value.
Ethnobotanical Benefits	ne	ne	ne	ne	Difficult to estimate ethnobotanical benefits and their value.
Ecosystem Benefits	ne	ne	ne	ne	Difficult to determine ecosystem benefits attributable to the implementation of section 7.
TOTAL					
Costs Over 10 Years	**$ 2,461,000**	**$ 2,465,000**	**$ 2,159,000**	**$ 2,163,000**	Figures exclude costs that are difficult to estimate.
Benefits Over 10 Years	**ne**	**ne**	**ne**	**ne**	Difficult to estimate.

THE LISTED PLANTS AND PROPOSED CRITICAL HABITAT[3] CHAPTER I

Under the Endangered Species Act of 1973, as amended (the Act), the United States Department of the Interior, Fish and Wildlife Service (the Service) proposes to designate critical habitat for threatened and endangered plant species on the island of Lana'i in Hawai'i. This chapter provides information on the listed plants and the proposed critical habitat units, most of which comes from the document "Endangered and Threatened Wildlife and Plants; Revised Determinations of Prudency and Proposed Designations of Critical Habitat for the Plant Species From the Island of Lana'i, Hawaii" (the proposed rule), published in the *Federal Register* on March 4, 2002 (67 FR 9805). In addition, the Service provided valuable information for this chapter in the form of overlay resource maps and detailed acreage data.

1. THE LISTED PLANTS

The Service proposes critical habitat for 32 threatened and endangered plant species on Lana'i. The proposed rule contains a detailed discussion of the plant taxa, including taxonomy, ecology, habitat requirements, historical and current distribution and threats for each of these species.

[3]**Note to Reader:** After learning about the proposed critical habitat in this chapter, readers who are already familiar with Maui county (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the methodology for conducting the economic analysis (Chapter V) may wish to skip these chapters, as appropriate, and proceed to the analysis of economic impacts (Chapter VI).

2. PROPOSED CRITICAL HABITAT UNITS

The Service is proposing eight critical habitat units on Lana'i. Based on the proposed rule and other sources, this chapter and Table I-1 provide information on the units, including the *primary constituent elements* essential for the conservation of each plant species, their general location and terrain, excluded features and structures, acreages, land ownership, existing land management, and existing improvements and activities in the units. The proposed rule provides detailed information on the critical habitat boundaries and the map coordinates of boundary points.

2.a. Primary Constituent Elements

Each of the proposed critical habitat units provides one or more of the *primary constituent elements* essential for the conservation of the plant species. The Service defines *primary constituent elements* on the basis of the habitat features of the areas where the plant species are reported. Habitat features include the type of plant community, associated native plant species, locale (e.g., steep rocky cliffs, talus slopes, stream banks), and elevation.

2.b Excluded Features and Structures

As indicated in the proposed rule, existing manmade features and structures do not contain, and are not likely to develop, *primary constituent elements*. As a result, the Service considers these features and structures to be excluded from the proposed critical habitat as "unmapped holes". Some of the "unmapped holes" the Service has identified span a large area of the designation and can be excluded by remapping boundaries. Specifically, the easternmost third of Unit G (Manele Bay), where the unit overlaps with part of a golf course, luxury homes, and graded lots for future home development, lacks the *primary constituent elements* and is therefore excluded.[4]

On the other hand, some of the existing manmade features and structures are small and cannot easily be excluded by remapping boundaries. The operation and maintenance of these manmade features and structures generally would not be impacted by critical habitat designation.

In addition to such manmade features and structures listed in the proposed rule, the Service has identified additional ones that do not contain *primary constituent elements*. Below is the modified list of excluded manmade features and structures:

[4] The Service indicates that the final rule for the critical habitat will feature remapped boundaries that exclude this larger area that lacks *primary constituent elements* (Memorandum to the Service, Washington Office, from the Service, Honolulu Field Office. March 21, 2002).

— Water system features, including, but not limited to, pumping stations, wells, pipelines, tunnels, and water tanks.

— Telecommunications towers and associated structures and equipment.

— Electrical power transmission lines and associated rights-of-way.

— Paved and unpaved roads and trails.

At the bottom of Table I-1, the section entitled "Improvements/Activities" indicates which of these features are associated with each unit.

Because these manmade features and structures are excluded from the proposed designation, they are also excluded from this economic analysis. Henceforth, references to the proposed critical habitat already exclude all features and structures discussed above unless indicated otherwise by footnotes.

2.c Acreage

As shown in Table I-1, the acreage encompassed within the boundaries of the eight proposed critical habitat units total approximately 19,405 acres, which is about 22 percent of the island.[5]

2.d Location and Terrain

The majority of the acreage is in uninhabited and relatively remote areas of the island:

— Unit A is near the northwestern shore of the island, but the remote location and difficult access preclude development;

— Proposed Units B, C and F are scattered along the mountain flanks;

— Proposed Unit D encompasses the mountain summit of Lana'i;

— Unit E is in agricultural land, but neither agriculture nor ranching takes place;

[5]This acreage estimate overstates the actual critical habitat acreage because it includes "unmapped holes", including development at Manele Bay and the existing manmade features and structures discussed in Chapter I, Section 2.b.

— Unit G covers portions of the southern shore of the island near one of the major development areas of the island. However, it remains uninhabited with no access other than a foot trail; and

— Unit H is a small islet off the south coast of the island designated as a bird sanctuary.

Detailed maps appear in the proposed rule.

2.e *Occupied* and *Unoccupied* Units

The Service considers about 3,819 acres (20 percent) of the proposed critical habitat to be *occupied* by the listed plant species and 15,584 acres (80 percent) to be *unoccupied*.[6] The *unoccupied* areas were included in the proposed designation because the Service believes that they are necessary to provide for the long-term survival and conservation of the species.

2.f Land Ownership

All of the area proposed as critical habitat is owned by one major private landowner. Some of the area is leased to the State by this landowner. Also, a small portion of the northwest part of the island is leased to the U.S. Navy.

2.g Existing Land Management

Land in the proposed critical habitat is subject to a variety of existing regulations and land-management programs that already limit activities in those areas. These include: Federal programs, State land-use controls and programs, county land-use controls, and land management by various public and private organizations. The regulations and land-management programs are described in Chapter IV, and Table I-1 at the end of this chapter identifies, by critical habitat unit, the amount of acreage under each type of control or management.

As indicated in Table I-1, none of the proposed critical habitat units contains land that is controlled by the Federal government as part of a military facility, a National Park, a National Wildlife Refuge, etc. Approximately 71 percent of the land proposed for critical habitat is in the State Conservation District–4,117 acres in the Limited Subzone and 9,689 acres in the Resource Subzone. The Conservation District is subject to State control or management, and development

[6]This acreage estimate overstates the actual critical habitat acreage because it includes "unmapped holes", including development at Manele Bay and the existing manmade features and structures discussed in Chapter I, Section 2.b.

and commercial activity is generally limited within the Conservation District (see Chapter IV for full discussion).

While the State manages land in the Conservation District, the County of Maui has primary responsibility for land in the other districts–namely, the Agricultural, Urban and Rural Districts. These three districts are subject to county land-use and development controls, including county community plans, zoning, and building code regulations affecting farm, residential, commercial, and industrial development and use. Of the proposed critical habitat designation, approximately 5,334 acres are in the Agricultural District; and approximately 110 acres (less than one percent) are in the Rural District. In Special Management Areas (SMAs) located along the shoreline, the county has an additional layer of regulation that provides special control on development, even for land located within the Conservation District (see Chapter IV for full discussion).

Table I-1. Critical Habitat Units, Lana'i Plants:
Acreage, Location, Ownership, Land Management, Improvements and Activities

Item	Units	All Units		Unit A	Unit B	Unit C	Unit D	Unit E1	Unit E2	Unit E3	Unit F	Unit G	Unit H
		Total	Share										
Total Area*	Acres	19,403		1,418	1,363	549	14,482	132	148	120	818	373	2
Area Occupied by Listed Plants	Acres	3,819	20%	13	222	-	3,471	4	-	-	-	107	2
Land Ownership													
Federal	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
State	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
County	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
Private, Major Owner	Acres	19,401	100%	1,416	1,363	549	14,482	132	148	120	818	372	2
Private, Small Owners	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
Federally Controlled or Managed													
National Parks or Refuges	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
FWS, non-plant populations	Count	-		-	-	-	-	-	-	-	-	-	-
State-Controlled or Managed													
Conservation District	Acres	13,805	71%	1,418	1,363	549	10,253	22	3	8	65	123	2
Protective	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
Limited	Acres	4,117	21%	1,418	1,363	549	599	-	-	-	65	123	-
Resource	Acres	9,689	50%	-	-	-	9,654	22	3	8	-	-	2
General	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
Special	Acres	-	0%	-	-	-	-	-	-	-	-	-	-
Hunting Area	Acres	4,747	24%	1,418	1,363	549	599	-	-	-	818	-	-
County-Controlled or Managed													
Agricultural District	Acres	5,334	27%	-	-	-	4,215	109	145	112	753	-	-
Urban	Acres	48	0%	-	-	-	-	-	-	-	-	48	-
Rural	Acres	216	1%	-	-	-	14	-	-	-	-	201	-
Special Management Areas		-	-	Shoreline	-	-	-	-	-	-	-	Shoreline	-
Improvements/Activities													
Paved Roads**	Count	3		-	-	-	3	-	-	-	-	-	-
Unpaved Rds or 4-wd Trails**	Count	27		3	2	2	13	2	1	1	3	-	-
Water Improvements**	Count	16		2	-	-	10	3	-	1	-	-	-
Power Transmission Lines**	Count	2		-	-	-	1	1	-	-	-	-	-
Other Structures**	Count	2		1	-	-	1	-	-	-	-	-	-
Hunting, State-Managed Units	Present	-		Present	Present	Present	-	-	-	-	Present	-	-
Bird Sanctuary	Present	-		-	-	-	-	-	-	-	-	-	Present

Note: entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

* This acreage estimate overstates the actual critical habitat acreage because it includes "unmapped holes", including development at Manele Bay and the existing manmade features structures discussed in Chapter I, Section 2.b.

** Manmade features within critical habitat units, but excluded from critical habitat.

PHYSICAL AND SOCIOECONOMIC PROFILE OF MAUI COUNTY[7] CHAPTER II

To provide context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents (1) physical descriptions of the main islands of Maui County (Maui, Moloka'i, Lana'i and Kaho'olawe); and (2) socioeconomic profiles of Maui County and each of the main islands. A summary of the socioeconomic data is presented in Table II-1.

1. PHYSICAL DESCRIPTIONS OF THE ISLANDS OF MAUI COUNTY

The four main islands and smaller islets of Maui County are situated in the middle of the main portion of the Hawaiian chain. O'ahu lies to the northwest and the Big Island of Hawai'i lies to the southeast. Less than a million years ago, the four islands of Maui County were physically connected—that once-single island is sometimes referred to today as "Maui Nui."

1.a. Island of Lana'i

Lana'i, the smallest of the inhabited main Hawaiian islands, is 13 miles long, 13.3 miles wide, and 139 miles square. It was formed from a single dome-shaped shield volcano that last erupted 1.3 million years ago and now has a maximum elevation of 3,370 feet at its summit, Lana'ihale.

Lana'i is sheltered from the wind by the much larger island of Maui, putting it in a rain-shadow during trade-wind weather. Rainfall on Lana'i is uncharacteristically low for Hawai'i, ranging from just 35 inches annually near Lana'ihale to less than ten inches in the southwestern part

[7] **Note to Reader:** Readers who are already familiar with Maui County may wish to skip this chapter and proceed to the next background-information chapters (Chapters III through V), or to the economic analysis (Chapter VI).

of the island. Lana'i has no perennial streams or lakes, and the sustainable groundwater yield is estimated at just six million gallons per day.

Because the northeastern (windward) coast of the island is sheltered from ocean forces and wave erosion, it is fringed with broad expanses of sandy beaches and sediment, with no appreciable sea cliffs. On the other hand, the southwest (leeward) coast is exposed to wave erosion from southwesterly storms, resulting in high sea cliffs. On the southeastern coast, strong winds have blown beach sand to form a 10- to 20-foot ridge of dunes.

1.b. Island of Maui

Maui, the second largest of the eight major islands, is 48 miles long, 26 miles wide, and 728 square miles in area. It was formed from the remnants of two large shield volcanos connected by an isthmus that drops to an elevation of less than 130 feet in the middle of the saddle.

The older West Maui Mountains (at 1.3 million years) are heavily eroded by streams that have cut deep valleys and ridges into the original volcano and have limited access to many of the interior regions. The highest point on West Maui is Pu'u Kukui at 5,788 feet, where the average rainfall is 400 inches per year. This is the second wettest spot in Hawai'i. Typical of older and eroded areas, West Maui hosts highly diverse regional flora.

Dominating East Maui is the 10,023-foot massive volcano Haleakala ("House of the Sun"). Haleakala retains its classic shield shape due to its comparative geological youth (750,000 years). It is considered to be an active volcano, although the last summit eruption occurred 800 to 1,500 years ago, and the last flank eruption occurred in about 1790. Average annual rainfall on Haleakala exceeds 300 inches a year on the windward (northeast) side of the mountain at about the 2,000- to 3,000-foot elevation; about 35 inches at the summit; and less than 30 inches on the dry leeward (south) side. Summit rainfall is low because the trade wind inversion (at about the 7,000-foot elevation) impedes the moisture-laden trade winds from reaching higher elevations. The sizable summit crater (7.5 miles long and 2.5 miles wide) is a dry cinder desert. Haleakala does not exhibit the diverse vegetation of the older West Maui Mountains.

1.c. Island of Moloka'i

Moloka'i is the fifth largest of the main Hawaiian islands at 38 miles long, up to 17 miles wide, and 266 square miles in area. It was formed from the coalescence of two large shield volcanoes and one much smaller volcano.

West Moloka'i, the older of the two large volcanoes (at 1.9 million years), is very flat, rising to only 1,381 feet with an east-west extent of about 12 miles. This elevation is insufficient to check the blustery trade winds or induce orographic rainfall. As a result, windy and dry (15 to 40 inches rainfall per year) conditions prevail, and coastal and inland sand dunes extend almost completely

across the northwestern corner of West Moloka'i. In this area, cattle and goats were introduced beginning in the 1800s. Subsequently, these ungulates overgrazed a former forest, resulting in severe erosion.

East Moloka'i is a slightly younger volcano (1.8 million years) and much larger. It measures 27 miles east to west and eight miles north to south. The eroded East Moloka'i Mountains comprise about two-thirds of the east-west extent of the island. They are dominated on the north coast by precipitous sea cliffs rising more than 3,600 feet—the tallest sea cliffs in the world. Also, three amphitheater-headed valleys open to the windward (north) coast, their ridges converging on the island's summit at Kamakou (4,970 feet). Rainfall on the windward side varies from 75 inches to over 160 inches per year. The gulch-scored leeward slopes of East Moloka'i descend to a narrow coastal plain on the south side of the island. Certain areas in the East Moloka'i Mountains are accessible via four-wheel-drive vehicle. Foot trails provide access to portions of the mountainous interior, but many areas have difficult access.

Between these two volcanoes lies the Moloka'i isthmus, commonly referred to as the Ho'olehua Plain. This area was formed when lava flowing from the East Moloka'i volcano overlapped the West Moloka'i shield.

The third distinctive volcano forms the four-square-mile Kalaupapa Peninsula on the north central coast. Windward cliffs 1,600 feet high and negotiable only on foot or by mule separate Kalaupapa from the rest of the island. Kalaupapa Peninsula receives 40 to 50 inches of rain a year.

1.d. Island of Kaho'olawe

Kaho'olawe lies 6.7 miles off the south coast of Maui. It is the smallest of the eight main islands, measuring 10.9 miles long, 6.4 miles wide, 45 square miles in area, and 1,477 feet at its highest point. Formed from the summit of a single volcanic dome, it is one of the older islands in the Hawaiian group. Also, it is arid, having the lowest rainfall of all the main islands. This is due to the combination of its low relief and its position in the lee of towering Haleakala. Annual rainfall averages about 25 inches on its eastern slopes, while the southwestern side of the island receives considerably less rain. By the early 1900s and continuing into the 1990s, overgrazing by goats reduced vegetation, and strong trade winds blew away vast quantities of soil. The landscape suffered further degradation during the approximately 50 years that the military used the island as a target for naval and aerial bombardment training, discussed below.

2. SOCIOECONOMIC PROFILE OF MAUI COUNTY

Table II-l summarizes economic and demographic information about the County of Maui, including the islands of Lana'i, Maui (four districts), Moloka'i (two districts) and Kaho'olawe (one district each). For statistical purposes, Kalawao County (the former colony on Moloka'i for quarantined Hansen's disease patients) is treated as a district of Maui County.

Many of the descriptive economic statistics for Maui County are available only at the aggregated County level; that is, they are not available for each individual island. Nonetheless, wherever possible, data for individual islands are used. Reflecting the data availability, the discussion below first presents information for Maui County, with an emphasis on describing quantitative indicators. Discussions of the individual islands that make up the County follow, with quantitative information provided as available. Estimates and figures presented in this section are taken from the State Data Book as well as the Maui County Data Book 2001, as are the estimates in Table II-1.

2.a. Maui County

2.a.(1) Population and Distribution

In the year 2000, the County of Maui had a population of 128,241residents, up 27.6 percent since the 1990 U.S. census. The total Maui County population amounted to 10.6 percent of the State population, the third largest of the four counties (after O'ahu).

Based on year 2000 estimates, the island of Maui hosts the greatest population by far of the four County islands, supporting about 91.7 percent of Maui County residents. A much smaller fraction of the County's population lives on Moloka'i (5.8 percent) and Lana'i (2.5 percent). Kaho'olawe has no permanent residents.

2.a.(2) Primary Economic Activities

The economy of Maui County is dominated by a large visitor industry located mostly on the island of Maui. It also features a large but shrinking agriculture industry and a budding high-technology industry, also on the island of Maui.

Tourism

Tourism overwhelmingly dominates the economy of the County (personal communication with Maui Chamber of Commerce, April 2002). The County hosted over 2.3 million visitors in the year 2000, resulting in an average of 43,854 visitors present on the islands (the average visitor census).

From 1990 to 2000, the average visitor census increased 11 percent. While the annual number of visitors to Maui County actually declined 3.6 percent during that time, the visitor census nonetheless rose due to an increase in the average length of stay. Of the visitors present, approximately 95.4 percent were on the island of Maui, 2.1 percent on Moloka'i, and 2.6 percent on Lana'i. Also, approximately 86 percent were Americans and most of the remainder were Japanese and Canadians.

From 1990 to 2000, visitor expenditures increased significantly, by approximately 39.5 percent. This increase was greater than the 27.7-percent increase in inflation as measured by the Consumer Price Index (CPI).

Further detail on the visitor industry on each island is provided in the island-specific discussions, below.

Agriculture

Agriculture, while the second-largest industry in the County, is much smaller than tourism. Specifically, in 2000, agricultural sales in the County totaled approximately $118 million, or only 4 percent of visitor expenditures.

In addition, Maui County's agriculture industry is becoming smaller in size. During the 1990s, agricultural sales declined 22.1 percent, due largely to contraction in plantation agriculture and increased competition from farmers on O'ahu.

Agricultural activities include sugar and pineapple plantations on the island of Maui, and diversified crops and ranching located mostly on the islands of Maui and Moloka'i. Further details on island-specific agriculture are discussed in the subsection for each island.

High-Technology Activities

As mentioned above, the island of Maui has a budding high-tech industry, although income figures for the industry have not been aggregated. Information on the specific activities is discussed in the subsection on Maui Island.

2.a.(3) Labor Force and Employment

In 2000, the County's civilian labor force numbered about 72,400 workers, up 28.1 percent since 1990. Employment reached 69,350 workers, up 28.9 percent since 1990 and resulting in a relatively low unemployment rate of 4.2 percent. The number of wage and salary jobs for Maui County increased 22.6 percent (versus 28.9 percent for all jobs), indicating a large increase in the number of self-employed workers and farmers.

As suggested by the discussion of primary economic activities above, most of the County's wage and salary jobs are concentrated in non-farming and non-manufacturing sectors. The primary employers are: (1) transportation, communications, and utilities; (2) trade (retail and wholesale); (3) services (hotel, tourism, and health); and (4) government. The number of wage and salary jobs rose in all these categories from 1990 to 2000. On the other hand, wage and salary jobs declined in the following sectors: (1) construction and mining; (2) manufacturing; (3) finance, insurance and real estate; and (4) agriculture (the declines would be less dramatic if self-employed workers and farmers were counted).

Employment estimates vary considerably from island to island within the County; more information is provided in the island-specific discussions below.

2.a.(4) Personal Income

Reflecting the growth in the tourism sector, the County's total personal income and per-capita income started out the decade in 1990 at $2 billion and $19,782, respectively, and finished the decade in 1999 at nearly $3 billion and $24,312, respectively. This represents a significant increase in overall income of 47.6 percent, and a more modest increase in per-capita income of 22.9 percent. While beneficial, this modest increase in per-capita income failed to keep pace with inflation as measured by the 25.5-percent increase in the CPI during the same 1990-to-1999 period. More information on personal income is provided in the island-specific discussions, below.

2.b. Island of Lana'i

2.b.(1) Population and Distribution

In the year 2000, Lana'i had an estimated population of 3,193 residents, up 31.6 percent since the 1990 U.S. census. Lana'i had the highest growth rate of all of the Maui County islands, which in part reflects its relatively smaller population. Nearly all residents live in the island's only residential community, Lana'i City, near the center of the island. However, two upscale residential communities are being developed near the island's two major resorts—one at Koele near Lana'i City and one at Manele Bay to the south.

2.b.(2) Primary Economic Activities

As explained below, an abrupt shift in the island's economic base occurred in the early 1990s. The opening of two luxury resorts, coupled with the closure of a large pineapple plantation, shifted the economy from one dominated by plantation agriculture to one dominated by tourism and resort-residential development.

Tourism

Lana'i's economy is dominated by tourism (personal communication with Maui Chamber of Commerce, April 2002). In the year 2000, Lana'i hosted 87,662 visitors, resulting in an average visitor census of 1,131, almost a third as large as the resident population.

From 1990 to 2000, the small tourism industry on Lana'i expanded significantly. The annual number of visitors to Lana'i increased by a startling 90.9 percent, and the average number of visitors present on the island (average visitor census) increased by a remarkable 352.3 percent. These increases were due almost entirely to two new resorts. In 1990 and 1991, Castle & Cooke opened the two world-class resorts—one at Koele (102 rooms) just northeast of Lana'i City, and the other a few miles away at Manele Bay (250 rooms) on the south shore. Taking into account an old eleven-room hotel and other visitor accommodations, there are a total of 368 visitors units on Lana'i (Visitor Plant Inventory, 2000). In addition, Castle & Cooke has the major entitlements for a second 150-room hotel at Manele Bay.

Visitor attractions include golf, ocean activities (diving, snorkeling, sailing, fishing, whale-watching, kayaking), horseback riding, hiking, mountain biking, exploring by four-wheel-drive vehicle, and hunting (axis deer, Mouflon sheep, and game birds).

Resort/Residential Community Development

A related industry involves development of luxury condominiums and custom homes as part of the resort development at Koele and Manele Bay. A total of 827 resort-residential single-family homes have been approved, of which eight were built by the end of 2001. A total of 332 multi-family units have been approved, and 61 were built by the end of 2001. At Koele, the condominium prices range in price from $600,000 to $850,000, while house lots range from $325,000 to $525,000. At Manele Bay, the condominiums range from $995,000 to $2.2 million, and house lots range from $850,000 to $15 million.

Nearly all of the purchases are for retirement homes or second homes. Expenditures on goods and services by the permanent and temporary residents, including expenditures on upkeep of their homes, will contribute to Lana'i's economy in a fashion similar to tourism.

Agriculture

In contrast to tourism and home development, agriculture comprises a very small fraction of Lana'i's economy (personal communication with Maui Chamber of Commerce, April 2002). The minor role of agriculture in Lana'i's economy represents the end of a decline in that industry that began in the early 1990s. Specifically, from the early 1920s to the early 1990s, Dole Food Company, Inc. (Dole), which came under the control of Castle & Cooke in the early 1930s, owned 98 percent of the island and operated the largest single pineapple plantation in the world—16,000

acres. The pineapple was barged to O'ahu where it was canned then shipped to the U.S. mainland and overseas markets. Pineapple was well-suited for the island because it requires little water which is limited on Lana'i. By the 1980s, however, the market for pineapple grown for canning was faltering in Hawai'i and, in 1993, Lana'i's Dole plantation was phased out.

Since the plantation closed, only about 100 acres remain in pineapple. It is sold to residents and the Lana'i hotels. Other diversified crops include small volumes of hay, macadamia nuts, papayas, bananas, vegetables, and herbs. Some of these diversified crops are purchased by the two resorts, particularly the herbs. Livestock include penned cattle and pigs.

Outside the plateau where pineapple was grown, most of the land designated for agriculture is unsuitable for farming. This reflects the fact that Hawai'i's Agricultural District is a catch-all category that includes all land not otherwise categorized, regardless of the agricultural quality of the land.

2.b.(3) Outlook for Growth and Socioeconomic Change

Lana'i has one of the lowest unemployment rates in the state: 3.5 percent in 2000. For the foreseeable future, economic and population growth on Lana'i is likely to be driven by (1) an expansion of tourism in terms of higher occupancy rates and increased visitor expenditures, and a new 150-room hotel; and (2) development of resort-residential homes for wealthy retirees and owners of second homes. This will continue Lana'i's transition from the rural, plantation-based economy that dominated the 20th century to a more upscale service economy in the 21st century.

Over the next ten years and beyond, no new hotels and no resort-residential development are anticipated beyond the current plans mentioned above. This assessment reflects current plans for the island as well as limits imposed by the available water supply.

2.c. Island of Maui

2.c.(1) Population and Distribution

In the year 2000, the island of Maui had 117,644 residents. The population increased 28.2 percent since the 1990 U.S. census, a significantly greater increase than Moloka'i and marginally less than Lana'i. As noted above, the island hosts approximately 91.7 percent of the total County population. In 2000, Maui Island's population was geographically distributed as follows (presented in order of most- to least-populated):

— Wailuku District (Central Maui): 52.1 percent

Wailuku and Kahului, which abut one another at the northern end of the isthmus, serve as the commercial and industrial center of Maui Island. They also

contain the County seat, the main airport, and Maui's main harbor. Most Wailuku District residents live in towns along the northern end of the isthmus and, to a lesser extent, along the southern end of the isthmus. The Wailuku District also hosts a large number of visitors, particularly in resorts along the south shore of the isthmus.

— Makawao District: 31 percent

Most Makawao District residents live in towns located "Upcountry" on the western slopes of Haleakala between the 1,000- and 4,000-foot elevations. To a lesser extent, they live in a few small towns near the shoreline at the northern and southern ends of the district. This district also hosts a large number of visitors, particularly in resorts along the south shore.

— Lahaina District (West Maui): 15.3 percent

Most residents of the Lahaina District live in towns located along the shoreline at the western end of the island. This district also hosts a large number of visitors in the West Maui resorts.

— Hana District: 1.6 percent

Most residents of the Hana District live in the town of Hana and in small communities scattered along the northern and eastern ends of Haleakala.

There are no large communities in the mountainous interior of West Maui, or along portions of the north and south shores of West Maui. Also, there are no large communities along the north, east and south flanks of Haleakala, or along the north and south shores of Haleakala. A variety of factors contribute to the lack of development in these areas, including steep slopes, difficult access, the need for watershed protection, local community preferences regarding development, and others.

2.c.(2) Primary Economic Activities

The island of Maui has a strong economy that is driven by a large and growing visitor industry, a large but shrinking agriculture industry, and a budding high-technology industry.

Tourism

Tourism is Maui Island's primary business (personal communication with Maui Chamber of Commerce, April 2002). Maui Island hosted over 2.2 million visitors in the year 2000, resulting in an average of 41,819 visitors present on the island. Reflecting trends at the County level, from 1990 to 2000 the annual number of visitors to Maui Island declined 4.2 percent, but the average visitor census increased 9.6 percent due to longer stays.

Most of the resorts are located at the western end of the island, along the south shore of Central Maui, and along the southwestern shore of Haleakala.

Maui Island's visitor industry is healthy, as exhibited by strong occupancy and room rates. Contributing factors include: (1) the robust economic growth in California and other western states; (2) a new generation of commercial aircraft that can depart from the short runway on Maui with sufficient fuel to fly to the U.S. mainland; and (3) a variety of natural and developed attractions. Like tourism across all the Hawaiian islands, Maui Island's tourism level declined following the terrorist attacks of September 11, 2001, but has since begun to recover.

Agriculture

The economic significance of agriculture on Maui Island is small compared to tourism (personal communication with Maui Chamber of Commerce, April 2002). This represents a significant contrast to most of the 1900s, however, when sugar and pineapple were the economic mainstays of Maui Island, with plantations located in Central Maui and West Maui. Currently, only two plantations remain: a large sugarcane plantation which is the dominant user of land in Central Maui, and a large pineapple plantation whose fields are split between Central Maui and West Maui. In 1999, a small sugarcane plantation in West Maui closed, thereby freeing land for other uses.

As plantation agriculture has declined, other types of agricultural activities have, to some extent, replaced it. Some of the fields in Central Maui and West Maui have been replanted in diversified crops (i.e., all crops other than sugarcane or pineapple). Also, some Upcountry Maui farmers take advantage of the cooler temperatures to grow specialized crops. Diversified crops on Maui Island include: macadamia nuts, coffee, papaya and other fruits, seed corn, flowers and nursery products, and vegetables. Finally, most of the agricultural land that is unsuitable for growing crops is used for grazing.

While the economic significance of agriculture on Maui is now small compared to tourism, it remains the island's dominant user of land and water.

High-Technology Activities

Maui has a growing high-technology industry that was forged largely on two separate complexes.[8] One is a grouping of five observatories near the summit of Haleakala. The observatories specialize in studies of the sun, galactic and quasar research, lunar and satellite ranging, and space surveillance.

The second high-technology complex is comprised of companies and operations at the Maui Research & Technology Park. The most prominent tenant is the Maui High Performance Computing Center, a national supercomputing center. Many of the companies in the Research & Technology Park take advantage of the Center's supercomputer, including some that support observatory operations.

2.c.(3) Outlook for Growth and Socioeconomic Change

The primary driving forces for Maui Island's economy will continue to be tourism and, to a much lesser extent, high-technology activities and diversified agriculture. However, limiting factors will be traffic congestion and possibly limited water in some parts of the island.

Most of the growth on Maui Island will continue to be on the west end of the island, on the southern shore of the isthmus, in the towns of Wailuku and Kahului, and in Upcountry Maui. Due to a variety of factors, including steep slopes, difficult access, the need for watershed protection, local community preferences regarding development, and others, little or no growth is anticipated in the following areas: (1) in the mountainous interior of West Maui; (2) along portions of the north and south shores of West Maui; (3) along the north, east and south flanks of Haleakala; and (4) along the north and south shores of Haleakala.

2.d. Island of Moloka'i

2.d.(1) Population and Distribution

In the year 2000, the island of Moloka'i had 7,404 residents, approximately 5.8 percent of the County's total population. The island's population has grown 10.2 percent since the 1990 U.S. census, a significantly smaller growth rate than those for Lana'i and Maui Island for the same period.

In the most recent census, only two towns had populations greater than 1,000 residents: Kaunakakai on the south coast (2,726); and Kualapu'u in central Moloka'i on Hawaiian Homestead Lands near the airport (1,936). The third largest community and a former plantation town, Maunaloa Town in West Moloka'i, had a population of 230. On the north side of the island,

[8] Specific data on the size of this industry are not available.

Kalaupapa had 147 residents. The remainder of Moloka'i's population lives in scattered communities along the narrow coastal plain on the south side of East Moloka'i, and in a small community near the now-closed Kaluakoi Hotel and Golf Club at the west end of the island.

There are no communities in the mountainous interior of East Moloka'i or on its flanks; no communities on the mountain that forms West Moloka'i or its flanks, with the exception of Maunaloa; no communities on the north shore other than Kalaupapa and a small community at the east end of the island; no communities along the west shore except for the former resort area; and no communities along the south shore of West Moloka'i.

2.d.(2) Primary Economic Activities

Moloka'i has a small rural economy that is based largely on tourism, agriculture, ranching, and limited aquaculture.

Tourism

Moloka'i hosted 64,560 visitors in the year 2000, resulting in an average visitor census of 904 visitors. Attractions include excursions to Kalaupapa, golf and ecotourism. However, even with the robust economic growth in California and other western states during the 1990s, Moloka'i's tourism industry has not expanded, primarily because it has not competed well with the other Hawaiian islands which have more attractions and offer direct mainland flights. Unlike Maui Island and Lana'i, both Moloka'i's annual number of visitors and average visitor census declined, down 37.7 percent and 17.8 percent, respectively, from 1990 to 2000. The drop in visitor count was due largely to the fact that some hotels closed during the 1990s, resulting in a 23.3-percent decrease in the number of visitor units from 559 in 1990 to 429 in 2000. In addition, occupancy rates suffered for the remaining units; the average occupancy rate for the 429 visitor units on Moloka'i was only 42.7 percent in the year 2000. Most recently, in January 2001, the island's largest hotel—the 138-room Kaluakoi Hotel and Golf Club—closed operations.

Despite the decline in number of visitors to Moloka'i, tourism remains one of the primary industries in Moloka'i. The Moloka'i Visitors Bureau is currently working with the Maui Visitors Bureau to attract more visitors to the island (personal communication with Maui Chamber of Commerce, April 2002).

Agriculture, Ranching and Aquaculture

Agriculture is the other primary industry in Moloka'i. Similar to Maui Island, agriculture remains a part of Moloka'i's economy but has changed in its characteristics over time. For the greater part of a century, pineapple was the island's chief industry. Plantations were located in West Moloka'i on the Ho'olehua Plain and on the western end near Maunaloa. However, the plantations closed by the early 1980s. A portion of the former plantation fields and other suitable agricultural

lands have been planted in other crops, including watermelons, seed corn and other seed crops, coffee, bananas, papaya, vegetables, flowers and nursery products, and grass grown for hay. Also, *taro* continues to be grown in Halawa Valley on the east end of the island. Finally, agricultural lands not planted in crops are used mostly for grazing cattle.

However, the future growth of agriculture on Moloka'i has been adversely affected by new competition from O'ahu, where the closure of sugar plantations in the mid-1990s resulted in the release of good farm land for diversified crops. Farmers on O'ahu have a competitive advantage because they are close to the large Honolulu market and, for export, Honolulu Harbor and the Honolulu International Airport. Competing farmers on Moloka'i must absorb shipping cost to O'ahu to supply these markets. As a result, agriculture is not expected to grow significantly.

In addition to diversified crops, aquaculture is being pursued on the sunny south shore of West Moloka'i and in a few of the old Hawaiian fishponds on the south shore of East Moloka'i. Fish, shrimp, and *limu* (seaweed) are harvested for local sale and for export to O'ahu.

2.d.(3) Outlook for Growth and Socioeconomic Change

In 2000, the unemployment rate was 14 percent, the highest in the major islands of the State. This high unemployment rate reflects the growing labor force combined with contraction in the visitor industry and slow or negative growth in other economic sectors. A number of residents engage in subsistence activity, including farming, hunting and fishing.

However, Moloka'i has been experiencing some improvement in its economy through the rural Empowerment Zone/Enterprise Communities (EZ/EC) program. This program is administered by USDA's Office of Community Development. The program promotes self-sustaining, long-term economic and community development in areas of poverty, unemployment and general distress. The program works by helping communities develop and implement comprehensive strategic plans which are supported by partnerships among private, public and non-profit entities.

Moloka'i was selected as an Enterprise Community in 1999, and began receiving federal funding from USDA. Project leaders work to leverage these federal funds with a broad array of partners, including Federal, State and local government, non-profit organizations, area businesses, public schools, and the University of Hawai'i. Currently, the Moloka'i Enterprise Community has attracted a total of 42 partners, with a leveraging ratio of 24:1 (i.e., since January 1999, $24 has been raised for every dollar from the EZ/EC grant). Partners may also provide technical support, project leadership and/or in-kind services.

With the implementation of its ten-year strategic plan, Moloka'i seeks to achieve economic growth and community development through environmental protection, the promotion of diversified agriculture, encouragement of tourism, and the addition of new community facilities. Results from the Enterprise Community designation are already noticeable. Since its designation, the Moloka'i

EC has contributed to the rapid decline in unemployment rate by creating a total of 88 new full-time jobs, with more than 80 percent of these jobs being sustainable positions (Moloka'i Enterprise Community Annual Report, 2002).

In summary, although Moloka'i is still experiencing slow economic and population growth, various efforts, including the EZ/EC program and cooperation between the Moloka'i Visitors Bureau and the Maui Visitors Bureau, may help revitalize the island's economy in the future.

2.e. Island of Kaho'olawe

2.e.(1) Population

Other than short-term workers and visitors, Kaho'olawe has no permanent resident population. In fact, no communities have existed on Kaho'olawe since before the 1940s.

2.e.(2) Activities on Kaho'olawe

The U.S. military assumed control of Kaho'olawe at the beginning of World War II (1941) and, for the next 49 years (through 1990), used the island for amphibious landing exercises; as a target for naval and aerial bombardment training; and for other training involving the live-firing of weapons. Before 1941, Kaho'olawe was used for ranching.

In 1994, the island was conveyed to the State and placed under the control of Native Hawaiians via the Kaho'olawe Island Reserve Commission (see Chapter IV). That same year Congress authorized $400 million for a ten-year program to clear the island of unexploded surface ordnance, and restore its cultural and natural resources. With funding from the U.S. Navy, a private contractor is clearing the island with the goal of making major portions of it safe for human access. The Navy estimates that 69 percent of the surface but less than ten percent of the subsurface will be cleared by the end of the ten-year period.

Selected areas will be cleared for specific uses including revegetation with native species, trails and roads, cultural sites, camping areas, and educational facilities. An education and cultural center is planned, and a rock quarry is being developed that will be used to improve the existing eight-mile road from the shoreline base camp at Hanakanaea to the Lua Makika Crater.

While Kaho'olawe has no permanent residents, about 50 workers live in barracks on the island, and another 325 workers are flown in from Maui Island four times a week for day visits to work in the ordnance-clearing effort. Also, the island is visited regularly by members of a Native Hawaiian organization that has a special arrangement with the Navy.

2.e.(3) Outlook for Growth and Socioeconomic Change

As indicated above, future land uses on Kaho'olawe are likely to include preservation, education and cultural uses once the island is cleared of unexploded ordnance.

Table II-1. Socioeconomic Profile of the County of Maui
(including Kalawao)

Item	1990	1999	2000	Growth since '90
Resident Population, County	100,504	n/a	128,241	27.6%
Maui Island	91,361	n/a	117,644	28.8%
Lahaina District	14,574	n/a	17,967	23.3%
Wailuku District	45,685	n/a	61,346	34.3%
Makawao District	29,207	n/a	36,476	24.9%
Hana District	1,895	n/a	1,855	-2.1%
Moloka'i Island	6,717	n/a	7,404	10.2%
Molokai, excluding Kalawao	6,587	n/a	7,257	10.2%
Kalawao County	130	n/a	147	13.1%
Lana'i Island	2,426	n/a	3,193	31.6%
Kaho'olawe Island	n/a	n/a	n/a	n/a
Visitors				
Annual Visitors, County	2,389,970	n/a	2,304,666	-3.6%
Maui	2,345,060	n/a	2,246,253	-4.2%
Moloka'i	103,630	n/a	64,559	-37.7%
Lana'i	45,930	n/a	87,662	90.9%
Average Visitor Census, County	39,500	n/a	43,854	11.0%
By Island				
Maui	38,150	n/a	41,819	9.6%
Moloka'i	1,100	n/a	904	-17.8%
Lana'i	250	n/a	1,131	352.3%
By Origin				
U.S. Visitors	36,250	n/a	37,676	3.9%
Foreign Visitors	3,250	n/a	6,178	90.1%
Income from Major Industries				
($ million)				
Visitor Expenditures, County	$ 2,097.2	n/a	$ 2,925.6	39.5%
Agricultural Sales, County	$ 151.5	n/a	$ 118.0	-22.1%
Labor				
Maui County				
Civilian Labor Force	56,500	n/a	72,400	28.1%
Employed	53,800	n/a	69,350	28.9%
Unemployed	2,700	n/a	3,050	n/a
Unemployment Rate	4.8%	n/a	4.2%	n/a

Table II-1. Socioeconomic Profile of the County of Maui (Including Kalawao)
(continued)

Item	1990	1999	2000	Growth since '90
Labor (continued)				
Maui Island				
Civilian Labor Force	52,400	n/a	67,550	28.9%
Employed	50,300	n/a	65,000	29.2%
Unemployed	2,100	n/a	2,550	n/a
Unemployment Rate	4.1%	n/a	3.8%	n/a
Lana'i				
Civilian Labor Force	1,400	n/a	1,800	28.6%
Employed	1,300	n/a	1,700	30.8%
Unemployed	100	n/a	50	n/a
Unemployment Rate	5.9%	n/a	3.5%	n/a
Moloka'i				
Civilian Labor Force	2,700	n/a	3,100	14.8%
Employed	2,200	n/a	2,650	20.5%
Unemployed	500	n/a	450	n/a
Unemployment Rate	18.1%	n/a	14.0%	n/a
County Jobs, Wage and Salary Only[1]	50,900	n/a	62,400	22.6%
Construction, mining	3,150	n/a	2,650	-15.9%
Manufacturing	1,950	n/a	1,750	-10.3%
Trans., communication, utilities	3,000	n/a	4,500	50.0%
Trade	13,650	n/a	16,700	22.3%
Finance, insurance, real estate	3,350	n/a	3,000	-10.4%
Services and miscellaneous	17,350	n/a	24,000	38.3%
Government	5,850	n/a	7,850	34.2%
Agriculture	2,600	n/a	1,950	-25.0%
Personal Income, County				
Total ($ million)	$ 2,010	$ 2,966	n/a	47.6%
Per capita	$ 19,782	$ 24,312	n/a	22.9%
Consumer Price Index—All	138.10	n/a	176.30	27.7%

1. 2000 job counts are preliminary.

Source: Department of Business, Economic Development & Tourism. The State Data Book. Annual.
Hawai'i Agricultural Statistics Service. *Statistics of Hawaii Agriculture*. Annual.

Note: Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

THE ENDANGERED SPECIES ACT[9] CHAPTER III

This chapter provides relevant information from the 1973 Endangered Species Act (the Act), including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service to insure that certain Federal actions do not endanger listed species or their habitats, and prohibited activities that apply to listed species.

1. ROLE OF SPECIES LISTING AND CRITICAL HABITAT DESIGNATION IN PROTECTING THREATENED AND ENDANGERED SPECIES

For species listed as threatened and endangered, the Act requires the Service to designate critical habitat to the maximum extent prudent and determinable. The Act defines critical habitat as the specific areas containing features essential to the conservation of a threatened or endangered species and that may require special management considerations or protection.

For listed species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to *jeopardize* the continued existence of the species. The Act defines *jeopardy* as any action that would appreciably reduce the likelihood of both the survival and recovery of the species.

For the critical habitat of listed species, section 7(a)(2) further requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or *adverse modification* of critical habitat. *Adverse modification* of critical

[9]**Note to Reader:** Readers who are already familiar with the Act may wish to skip this chapter and proceed to the next background-information chapters (Chapters IV and V), or to the economic analysis (Chapter VI).

habitat is defined as any direct or indirect alteration that appreciably diminishes the value of critical habitat for the survival and recovery of the species.

As stated in the proposed rule, "... critical habitat also provides non-regulatory benefits to the species by informing the public and private sectors of areas that are important for species recovery and where conservation actions would be most effective." "Critical habitat also identifies areas that may require special management considerations … and may help provide protection to areas where significant threats to the species have been identified or help to avoid accidental damage to such areas."

2. CONSULTATION UNDER SECTION 7 OF THE ACT

In accordance with section 7 of the Act, the implementing regulations require Federal agencies to consult with the Service whenever activities they fund, authorize, or carry out may affect listed species or designated critical habitat. Section 7 consultation with the Service is designed to ensure that current or future Federal actions do not appreciably diminish the value of critical habitat for the survival and recovery of a listed species.

The Service has authority under section 7 to consult on activities on land owned by individuals, organizations, states, or local and tribal governments only if the activities on the land have a *Federal nexus*. A *Federal nexus* occurs when the activities require a Federal permit, license, or other authorization, or involve Federal funding. The Service does not have jurisdiction under section 7 to consult on activities occurring on non-Federal lands when the activities are not Federally funded, authorized, or carried out. In addition, consultation is not required for activities that do not affect listed species or their critical habitat.

When consultations concern activities on Federal lands, the relevant Federal Action agency initiates consultation with the Service. When an activity proposed by a state or local government or private entity requires a Federal permit or is Federally funded or carried out, the Federal agency with the *nexus* to the activity initiates consultation with the Service. For example, the Army Corps of Engineers is the agency that issues section 404 permits under the Clean Water Act, so it is the Action agency that initiates consultation when an activity that requires a permit may affect an existed species or designated critical habitat.

The consultation begins after the Federal Action agency determines that its action may affect one or more listed species or their designated critical habitat, even if the effects are expected to be beneficial since projects with overall beneficial effects could include some adverse impacts. Consultations are frequently conducted for multiple species if more than one species is affected by the action.

The consultation between the Federal Action agency and the Service may involve informal consultation, formal consultation in the case of adverse impacts, or both. Informal consultation may

be initiated via a telephone call or letter from the Action agency, or a meeting between the Action agency and the Service. In preparing for an informal consultation, the Action agency compiles all the biological, technical, and legal information necessary to analyze the scope of the activity and discusses strategies to eliminate adverse effects on listed species or critical habitat. Through informal discussions, the Service assists the Action agency and the Applicant, if any, in identifying and resolving potential conflicts at an early stage in the planning process, and may make recommendations, if appropriate, on ways to avoid adverse effects.

If during informal consultation the Federal Action agency determines that its action (as originally proposed or revised and taking into account direct and indirect effects) "is not likely to adversely affect" listed species or critical habitat (e.g., the effects are beneficial, insignificant or discountable), and the Service agrees with that determination, then the Service provides concurrence in writing and no further consultation is required.

But if the proposed action, as revised during informal consultation, is still likely to adversely affect listed species or critical habitat, the Action agency must request in writing initiation of formal consultation with the Service and submit a complete initiation package. Formal consultations, which are subject to specific timeframes, are conducted to determine whether a proposed action is likely to *jeopardize* the continued existence of a listed species or destroy or *adversely modify* designated critical habitat. This determination depends on the extent to which a project may affect the species. Many variables, including the project's size, location and duration, may influence the extent of the impact and, in turn, the determination of a "may affect" opinion.

If the Service finds, in its biological opinion, that a proposed action is <u>not</u> likely to *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* the critical habitat—even though the action may adversely affect listed species or critical habitat—then the action likely can be carried out without violating section 7(a)(2) of the Act.

On the other hand, if the Service finds that a proposed action is likely to *jeopardize* the continued existence of a listed species and/or destroy or *adversely modify* the critical habitat, then the Service provides the Action agency with reasonable and prudent alternatives that will keep the action below the thresholds of *jeopardy* and/or *adverse modification*, if any can be identified.

The Service works with Action agencies and Applicants in developing reasonable and prudent alternatives. A reasonable and prudent alternative is one that (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. The Service will, in most cases, defer to the Action agency's expertise and judgment as to the feasibility of an alternative. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of a project. Costs associated with implementing reasonable and prudent alternatives vary accordingly.

3. TAKING AND OTHER RESTRICTIONS OF THE ACT

3.a. Wildlife Species

Regardless of any *Federal involvement* and/or critical habitat designation, once a species has been formally listed as threatened or endangered, it is entitled to certain regulatory protections under the Act. First and foremost, section 9 of the Act specifically prohibits the *taking* of any endangered species of fish or wildlife (the prohibition does not extend to plants). The term *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The regulations at 50 CFR section 17.3 define "harm" to mean an act that actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. In addition, endangered species, their parts or any products made from them may not be imported, exported, possessed or sold. Section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9 to threatened species. While clearly prohibiting direct injury to individuals of a listed species, the restrictions on *takings* also apply to actions that destroy or alter the habitat of a listed species if the habitat alteration would result in harm to the species.

However, the Act allows the Service to permit *take* by private applicants that would otherwise be prohibited, provided such *taking* is "incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity." Section 10(a)(1)(B) of the Act allows non-Federal parties planning activities that have no *Federal nexus*, but which could result in the incidental *taking* of listed animals, to apply for an incidental *take* permit. The application must include a habitat conservation plan laying out the proposed actions, determining the effects of those actions on affected fish and wildlife species and their habitats (often including proposed or candidate species), and defining measures to minimize and mitigate adverse effects. The Service may elect to issue an incidental *take* permit if the incidental *take* is to be minimized by reasonable and prudent measures and implementing terms and conditions that are stipulated in the permit.

3.b. Plant Species

Section 9(a)(2) of the Act states that it is unlawful to remove and possess any endangered plant species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, damage, or destroy any such species on any other area in knowing violation of any state law. In addition, endangered species, their parts or any products made from them may not be delivered, received, transported, shipped or sold in interstate or foreign commerce. As above, section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9(a)(2) to threatened plant species.

However, the Service may give permission to remove a listed plant from areas under Federal jurisdiction, and may also give permission for actions that are otherwise prohibited by section 9 of

the Act for "scientific purposes or to enhance the propagation or survival of the affected species including, but not limited to, acts necessary for the establishment and maintenance of experimental populations."

EXISTING PROTECTIONS IN MAUI COUNTY[10] CHAPTER IV

In addition to the Act, other existing regulations and land-management programs protect Hawai'i's threatened and endangered species and their habitats. This chapter provides an overview of these protections, including: other Federal programs, State protections for listed species, State land-use controls affecting public and private lands, county land-use controls, and land management by various public and private organizations. Those protections in place on proposed critical habitat are summarized in Table I-1. As appropriate, the information in this chapter and in Table I-1 is used in Chapter VI to estimate the section 7 economic impacts that occur over and above impacts attributable to existing protections.

1. FEDERAL SPECIES PROTECTIONS AND LAND MANAGEMENT

1.a. Integrated Natural Resources Management Plans

The Sikes Act Improvements Act (SAIA) of 1997 requires every military installation containing land and water suitable for the conservation and management of natural resources to complete, by November 17, 2001, an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to integrate the mission of the military installation with stewardship of the natural resources found there. Each military installation that has listed species or critical habitat on areas it manages consults with the Service on its INRMP.

[10]**Note to Reader:** Readers already familiar with existing protections in Hawai'i of threatened and endangered species and their habitats may wish to skip this chapter and proceed to the approach to the analysis (Chapter V), or to the economic analysis (Chapter VI).

1.b. Conservation Partnerships Program, Pacific Islands Ecoregion

The Service's Conservation Partnerships Program is a collection of voluntary habitat restoration programs having the goal of restoring native Pacific Island ecosystems through collaborative projects with private landowners, community groups, conservation organizations, and other government agencies. The Program can provide cost-share funds, as well as information on habitat restoration techniques, native species, Safe Harbor Agreements, additional funding sources, required permits, and potential vendors of restoration services (fence contractors, nurseries, etc.) The Program is divided into five sections, discussed below.

1.b.(1) Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. The PFW Program was established to offer technical and financial assistance to landowners who wish to restore wildlife habitat on their property. PFW Programs can include constructing fences to exclude feral ungulates; controlling the population of feral ungulates, weeds, rodents, and alien insects; restoring native ecosystem elements such as hydrology and micro-habitat conditions; and reintroducing native species.

The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. If warranted, the Service also provides participating landowners with technical assistance to develop Safe Harbor Agreements that cover habitat managed for endangered or threatened species. The Agreements provide assurances to landowners that additional land, water, and/or restrictions on uses of natural resources will not be imposed as a result of their voluntary conservation actions.

Since funding is limited, the projects given the highest priority are those that manage or reestablish natural biological communities and provide long-term benefits to declining migratory bird and fish species and species that are endangered, threatened, or proposed for listing; and projects on private lands that provide expanded habitat for wildlife populations that inhabit National Wildlife Refuges.

1.b.(2) The Hawai'i Biodiversity Joint Venture

The Hawai'i Biodiversity Joint Venture (HBJV) is a public-private effort to protect, maintain, improve, and restore the native biological diversity of the Hawaiian Islands. In this program, the Service's mission is to work with others to conserve, protect, and enhance fish, wildlife, and plant populations and their habitats.

The HBJV was initiated with the following goals:

— Maintain natural communities and habitats for native species;
— Support efforts to cooperatively manage significant native ecosystems on public and private land;
— Develop natural resource management techniques to address widespread threats (such as feral ungulates, weeds, rats, and alien insects) to Hawai'i's native ecosystems;
— Restore former wetlands, native forests and other natural communities on public and private lands; and
— Protect native Hawaiian ecosystems and natural communities through land and water acquisition and management.

Since funding is limited, the Service gives priority to projects that implement management or research actions that directly contribute to protecting or restoring habitats for multiple endangered, threatened, candidate, or rare species; address key threats to native ecosystems or habitats; and benefit rare or unique ecosystems or habitats.

1.b.(3) Pacific Islands Coastal Program

The Pacific Islands Coastal Program identifies and conserves important coastal natural resources. The goals of the program are to:

— Identify and prioritize coastal natural resources and threats;
— Implement on-the-ground projects in partnership with others; and
— Promote public stewardship of coastal fish, wildlife, plants and their habitats.

The objectives of the program include:

— Protecting and restoring coastal wetlands and uplands, anchialine pools, estuaries, coral reefs and streams;
— Preventing and eradicating invasive alien species in coastal areas;
— Protecting and restoring watersheds for native species' habitat needs;
— Building public support through partnerships, education and community involvement; and
— Inventorying and mapping coastal resources.

1.b.(4) Endangered Species Landowner Incentive Program

The Endangered Species Landowner Incentive Program is a focused effort to combine cost-share funds and regulatory relief incentives (Safe Harbor Agreements and Candidate Conservation

Agreements) to address high-priority habitat restoration needs of endangered, threatened and candidate species.

1.b.(5) Other Habitat Restoration Programs

Other Habitat Restoration Programs include the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. In addition, the Conservation Partnerships Program seeks to provide a connection between habitat restoration projects and non-Service funding sources.

1.c. Wildlife Habitat Incentives Program

Under the Wildlife Habitat Incentives Program (WHIP), the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) provides assistance to landowners and lessees (leases must be five years or more) to protect and restore Hawai'i's native habitats as well as habitats of threatened and endangered species. In Hawai'i, the focus is on the following habitats:

- Threatened/endangered plant species habitat;
- Native forests/riparian areas adjacent or connected to a native forest reserve, wildlife refuge, or other preserved forest/riparian area;
- Montane wetlands and bogs;
- Coastal dunes that support rare plants, seabirds, monk seals or turtles;
- Anchialine pools;
- Endangered waterbird and migratory bird habitat; and
- Caves and rare species habitat.

The NRCS works with private landowners and lessees to help them develop a Wildlife Habitat Development Plan for their land that benefits native wildlife and meets other goals and objectives of WHIP. If the Plan is selected for funding, a five- to ten-year contract is entered into whereby the landowner or lessee agrees to undertake wildlife habitat development practices such as noxious weed control, fencing, planting of native trees, and wetland restoration. In turn, NRCS reimburses the landowner or lessee 75 percent of the cost of carrying out these practices at specified rates. However, the funds cannot be used for mitigation of any kind, or on any land designated as converted wetland.

1.d. Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a voluntary USDA conservation program for farmers and ranchers who wish to address serious threats to soil, water, and related natural resources on their property. Administered through NRCS, EQIP provides technical, financial and education assistance for designated priority areas or significant statewide resource concerns.

Eligible land includes cropland, rangeland, pasture, forestland, and other farm or ranch lands. To evaluate proposed EQIP projects, NRCS first assesses the environmental benefits to be achieved from the planned implementation of conservation practices. Subsequently, applications are then ranked based on the amount of financial assistance requested and the projected environmental benefits.

EQIP offers five- to ten-year contracts for the implementation of conservation practices in each site-specific conservation plan. Each conservation plan, developed with assistance from NRCS or other service provider, must treat the targeted resource concern to a sustainable level. NRCS may pay up to 75 percent of the costs for eligible conservation practices which improve or maintain the health of the natural resources in the area.

Within Maui County, the east end of Moloka'i has been designated as an EQIP priority area to address resource concerns about erosion, sedimentation, pest infestation and insufficient water supply.

1.e. Conservation Reserve Program

The Conservation Reserve Program (CRP) is a voluntary program administered through the Farm Service Agency, with technical assistance provided by the NRCS. By offering annual rental and cost-share assistance, NRCS encourages farmers and ranchers to plant long-term vegetative cover to improve soil, water, and wildlife resources.

To be eligible for CRP, land must have been planted in an agricultural commodity two out of the last five years. Some marginal pastureland may also quality for CRP if suitable for planting. In addition, the land must be considered highly erodible or subject to scour erosion. Finally, the land must be devoted to any of a number of highly beneficial environmental practices, such as filter strips, riparian buffers, grass waterways, shelter belts, wellhead protection areas, and other similar practices.

Annual rental payments are made based on the agricultural rental value of the land. Cost-share assistance will cover up to 50 percent of the cost of establishing the grass or trees on the land. CRP contracts last from ten to 15 years, depending on the goals of the operator.

1.f. National Parks

The National Park System, operated by the National Parks Service, was established to preserve natural areas in the United States so that they can be enjoyed by current generations and preserved for future generations. Within Maui County, Maui and Moloka'i each has a national park.

— Haleakala National Park (Maui): this park covers 28,655 acres (44.8 square miles), including the summit of Haleakala, Haleakala Crater, Kipahulu Valley (a biological reserve closed to the public), and Ohe'o Gulch, which extends down to the sea. Mostly wilderness, the Park is home to 11 threatened and endangered plant species and the endangered Sphinx moth. A 1999 Haleakala National Park draft *Resources Management Plan* provides for permanent protection and management of the lands within the Park, and details the management issues and strategies used by the Park to protect, restore and enhance the rare and native plants and their habitat. These strategies include control of or research on non-native ungulates, rodents, invertebrates and weeds; fire control; and habitat restoration.

— Kalaupapa National Historical Park (Moloka'i): this park contains the historic Hansen's disease isolation settlement of Kalaupapa, which consists of 1) a residential area on the leeward (western) side of the Kalaupapa Peninsula that is still home to many Hansen's disease residents; 2) two historic churches in Kalawao on the windward (eastern) side; and 3) a small airport and a lighthouse built in 1909 on the northern tip of the Peninsula. The Park and the lighthouse are listed separately on the National Register of Historic Places as national historic landmarks. A section of the Park is also within the North Shore Cliffs National Natural Landmark.

1.g. National Wildlife Refuges

Over 500 National Wildlife Refuges across the United States form a system of habitats managed by the Service. Hawai' i's Refuges were established to protect the Islands' unique native plants and animals and their habitats. Within Maui County, Maui and Moloka'i each contains a Refuge.

— Kealia Pond National Wildlife Refuge (Maui): Kealia Pond, which covers 50 to 400 acres depending upon the season, lies adjacent to Ma'alaea Bay along the south central coast of Maui near the town of Kihei. The main body of the pond is separated from the Pacific Ocean by a narrow band of coastal sand dunes and a major road. The refuge protects the Hawaiian stilt, Hawaiian coot, black-crowned night heron, Hawaiian duck, migratory waterfowl, seabirds and introduced species.

— Kakahaia National Wildlife Refuge (Moloka'i): five miles east of the main town of Kaunakakai, this refuge protects the endangered Hawaiian coot and Hawaiian stilt, as well as ten other species of bird. This 44-acre refuge contains a 15-acre freshwater pond, a seven-acre manmade impoundment built to provide additional shallow water habitat, and a marsh with dense thickets of bulrush.

2. STATE LAND MANAGEMENT

2.a. State Districting

All lands in Hawai'i are allocated by the State into one of four districts: Conservation, Agricultural, Urban or Rural. The State, through its Department of Land and Natural Resources (DLNR) and its Board of Land and Natural Resources (the Board), has primary land-management responsibility for activities and development in the Conservation District, while the counties have primary responsibility in the Urban, Rural and Agricultural Districts.

2.b. The Conservation District

The purpose of the Conservation District is to conserve, protect and preserve the State's important natural resources through appropriate management in order to promote the long-term sustainability of these natural resources, and to promote public health, safety and welfare (Hawai'i Revised Statutes, Chapter 183C). To this end, only limited development and commercial activity are allowed in the Conservation District. "Important natural resources" include the watersheds that supply potable water and water for agriculture; natural ecosystems and sanctuaries of native flora and fauna, particularly those which are endangered; forest areas; scenic areas; significant historical, cultural, archaeological, geological, mineral and volcanological features and sites; and other designated unique areas.

Permission is required to use land, construct facilities, or conduct other activities in the Conservation District (see below). Permits for routine uses or activities are issued by DLNR, while more complex activities or uses (such as certain construction projects and commercial operations) require formal approval of a Conservation District Use Application (CDUA) by the Board, and often require an approved management plan.

2.c. Conservation District Subzones

All land in the Conservation District has been assigned to one of five subzones that reflect a hierarchy of uses from the most restrictive to the most permissive. These subzones are the Protective Subzone (the most restrictive), Limited, Resource, General and Special (Hawai'i Administrative Rules, Title 13, Chapter 5). Except for the Special Subzone, all uses and activities allowed in a more restrictive subzone in the hierarchy are allowed in the less restrictive subzones.

2.c.(1) Protective Subzone

The Protective Subzone, the most restrictive of the five subzones, was established to "… protect valuable resources in designated areas such as restricted watersheds … plant and wildlife sanctuaries … and other designated natural and unique areas." Correspondingly, lands and waters generally included in this subzone are needed to protect watersheds, water sources, and water supplies; and to preserve the natural ecosystems of native plants and wildlife, particularly endangered species.

No structures, homes, or farm activities are allowed in the Protective Subzone, with two exceptions. First, the land can be used by State and county governments and by non-government entities that serve the public (e.g., the local utility companies) "for public purpose"—i.e., to fulfill mandated government functions for the public benefit such as transportation systems, water systems, and communications systems or recreational facilities. Second, Native Hawaiians owning *kuleana* land (land that was granted to Native-Hawaiian tenants in the mid-1800s) may use it for agriculture or single-family residences if their land was used "historically and customarily" for these purposes.

Allowed uses (by permit or Board approval) in the Protective Subzone include: replacing or reconstructing an existing structure and some types of accessory structures, habitat improvements for plant and wildlife sanctuaries, Natural Area Reserves, wilderness areas and scenic areas, limited removal of certain trees, and removal of noxious plants from small areas provided that the ground is not disturbed significantly. Limited landscaping is allowed, but is restricted to plants that are endemic or indigenous; alien subspecies are specifically prohibited.

2.c.(2) Limited Subzone

The Limited Subzone encompasses areas that are potentially dangerous to the public due to possible flooding, soil erosion, *tsunami* (tidal waves), volcanic activity or landslides. Lands having a general slope of 40 percent or more are also included in this subzone. The purpose of the Limited Subzone is to limit uses where natural conditions suggest that human activity should be constrained.

In addition to what is permitted in the Protective Subzone, the following activities and uses are allowed in the Limited Subzone by permit or Board approval: accessory structures near existing structures; single-family homes (one per lot) if State and county regulations are followed;

agricultural activities; facilities or devices used to control erosion, floods and other hazards; botanical gardens and private parks; landscaping; and removal of noxious plants in areas larger than 10,000 square feet that result in significant ground disturbance.

2.c.(3) Resource Subzone

The Resource Subzone encompasses lands that are suitable for growing and harvesting commercial timber or other forest products, park land, and land for outdoor recreation (hunting, fishing, hiking, camping and picnicking, etc.). The purpose of the Resource Subzone is to develop properly managed areas to ensure the sustainable use of Hawai'i's natural resources.

In addition to what is permitted in the Protective and Limited Subzones, the following activities and uses are allowed in the Resource Subzone by permit or Board approval: commercial forestry under an approved management plan, and mining and extraction of any material or natural resource.

2.c.(4) General Subzone

The General Subzone is used to designate open space where special conservation uses may not yet be defined, but where urban uses may be premature. This subzone encompasses lands that may not be adaptable to or needed currently for urban, rural or agricultural use. The General Subzone also includes lands that are suitable for farming, flower gardening, nursery operations, orchards and grazing. Golf courses are not allowed.

In addition to what is permitted in the Protective, Limited and Resource Subzones, facilities necessary for the above-mentioned uses are allowed by permit when these facilities are compatible with the natural physical environment, and the use promotes natural open space and scenic value.

2.c.(5) Special Subzone

Special Subzones are designated for educational, recreational and research purposes. These subzones set aside lands possessing unique developmental qualities that complement the natural resources of an area.

2.d. Additional Management in the Conservation District

In addition to the five subzones in the Conservation District, the State has established further controls by defining other areas it manages within the Conservation District. These include Forest Reserves, the Natural Area Reserve system, State Hunting Units, State parks and State trails. These are discussed below.

2.d.(1) Forest Reserves

State Forest Reserves were first established in Hawai'i over a century ago to protect the supply of high-quality water that was being threatened due to the destruction of Hawai'i's rainforests. The stated purpose of a Forest Reserve is to protect native ecosystems and important watersheds (Hawai'i Revised Statutes, Sections 183-2 and 183-17). Most of Hawai'i's Forest Reserves are in the Resource Subzone. Limited collecting for personal use (e.g., *ti* leaves and bamboo) is allowed by permit, as is limited (no more than $3,000 value per year) commercial harvesting of timber, seedlings, greenery and tree ferns. Commercial forestry operations are allowed only with approval from the Board. Permission is required to reside in a Forest Reserve, hunt (see below), camp and fish. Land vehicles, mountain bikes, horses, mules and leashed dogs are allowed on designated roads and trails.

Collecting endangered or threatened plants or wildlife is not allowed and, except in the situations described above or with Board approval, no forms of plant or animal life may be removed, injured or killed.

Within Maui County, State Forest Reserves are found on Maui and Moloka'i. Maui is home to the West Maui, Ko'olau, Hana, Kipahulu, Kahikinui, Kula, and Makawao Forest Reserves; and Moloka'i is home to the Moloka'i Forest Reserve.

2.d.(2) Natural Area Reserves

A Natural Area Reserve (NAR) is based on the concept of protecting ecosystems rather than individual species, with the goal of preserving and protecting representative samples of Hawaiian biological ecosystems and geological formations (Hawai'i Revised Statutes, Sect. 195-5). Although most NARs are located in the State Conservation District, they can include land in other Districts.

Management activities in a NAR include restoring and enhancing existing populations of native plants, removing non-native weeds, and working with local hunters to keep non-native animal populations low in sensitive areas.

Permitted activities in NARs include hiking, nature study and bedroll camping. Game hunting and research or educational activities are allowed by permit. Prohibited activities in NARs include: improvements or construction; tent camping; vehicles, except on designated roads; and removing, injuring, killing or introducing plants or wildlife.

Within Maui County, NARs are found on Maui and Moloka'i. Maui is home to the following NARs:

— 'Ahihi-Kina'u (2,045 acres): this reserve is the first reserve created under the Natural Area Reserve System. Sparsely vegetated, the reserve is unique in

that it contains an example of the most recent lava flow on the dry south flank of East Maui. The reserve also contains a marine area with high and low salinity anchialine pools that house a diversity of rare Hawaiian shrimps and native Hawaiian cave animals in coastal lava tubes. Coastal dry shrublands, coastal mesic boulder beach communities, and examples of pioneer vegetation can also be found within this NAR serving as habitats for other rare native plants and animals.

— West Maui (6,702 acres): this reserve encompasses lowland and montane native communities ranging from dry grasslands to wet'ohi'a forests. The reserve also includes bogs, montane lakes, forest bird habitat, and rare and endangered plants. The areas are extremely important watershed sites which contain the headwaters of perennial streams.

— Hanawi (7,500 acres): this reserve is located on the wet slopes of the north flank of Haleakala. It contains a rare subalpine grassland as well as montane and lowland semi-wet and wet grasslands and forests. Rare plants and endangered birds are also protected in this reserve.

— Kanaio (876 acres): this reserve is located in rough lava terrain on the southeast slope of Haleakala. The reserve protects a remnant of the native dryland forest that once covered the leeward slope of Haleakala. Kanaio provides visitors with a rich assemblage of native dryland trees and shrubs.

Moloka'i is home to the following NARs:

— Pu'u Ali'i (1,330 acres): located in the mountains of northern Moloka'i, this reserve is a wet summit plateau inhabited by wet forests, mixed fern and shrub montane cliff communities, wet shrublands, and Hawaiian intermittent stream communities. The reserve also contains forest bird habitat and is an important part of the Moloka'i watershed.

— Oloku'i (1,520 acres): one of the few areas left undisturbed by feral ungulates, this reserve encompasses an isolated, cloud-shrouded mountain plateau with slopes extending down to sea cliffs. The reserve contains both wet and dry ecosystems, coastal dry grasslands, lowland and montane wet and mesic forests. Rare snails were also observed during a 1989 survey of this area.

2.d.(3) Wildlife Sanctuaries

Wildlife sanctuaries are established by the State to conserve, manage and protect indigenous wildlife (Hawai'i Revised Statutes, Sections 13-125). Within these sanctuaries, the following activities are prohibited: (1) to remove, disturb, kill, or possess any form of plant or wildlife; and (2) to introduce any form of plant or animal life. Also, human activity is strictly limited: no firearms or hunting equipment are allowed in nearly all sanctuaries; no camping, no fires, and no vehicles are allowed except on designated roads; and, in many cases, no entry is allowed except by permit for scientific, educational, or conservation purposes.

Several bird, plant, and other wildlife sanctuaries exist in Maui County. Wildlife sanctuaries in Maui include Pauwalu Point Wildlife Sanctuary located on the north shore of East Maui; the Manawainui Plant Sanctuary in West Maui; and several seabird sanctuaries along the island's coast. Moloka'i's wildlife sanctuaries include Mokapu Bird Sanctuary located on an islet off the north shore; the Kamiloloa Plant Sanctuary in East Moloka'i; and a few seabird sanctuaries along the coast of East Moloka'i. Finally, Lana'i also maintains several seabird sanctuaries located mostly along the south coast.

2.d.(4) Hunting Units

A total of 47 hunting units, administered by DLNR, have been established across the State to control game hunting (Hawai'i Administrative Rules, Title 13, Chapters 122 and 123). Maui has seven such hunting units totaling 105,318 acres for hunting feral pigs and goats, pheasant (two species), Francolin (two species), chukar partridge, quail (two species), dove (two species), and wild turkey. Moloka'i also has seven hunting units totaling about 16,000 acres; these units feature feral pigs, goats, and axis deer; ringneck pheasant; chukar partridge; Francolin (two species); quail (two species); dove (two species); and wild turkey. Finally, Lana'i has two hunting units, encompassing the western third of the island and totaling about 30,000 acres. These two hunting units are available for hunting axis deer, mouflon sheep, ring-necked pheasant, chukar partridge, Francolin (two species), quail (three species), dove (two species), and wild turkey. An additional 30,000 acres are privately managed for hunting in Lana'i.

Within the State Hunting Units, hunting is a licensed activity and is restricted. Restrictions vary among the islands and address: bag limits, hunting seasons, days allowed, hours of the day, and hunting method (rifle, muzzleloader, shotgun, handgun, bow and arrows, spear, dogs and knives). DLNR's intent is to manage the hunting areas, game-mammal populations, and the level of hunting activity to achieve a reasonable balance between (1) recreational benefits for hunters and (2) protection to native ecosystems and threatened and endangered plants. Game hunting restrictions on private land are set by the landowner.

2.d.(5) State Parks

The State Parks System was established to govern the use and protection of all lands and historical and natural resources in Hawai'i's State parks (Hawai'i Revised Statutes, Sections 184-3 and 184-5). Within State parks, approvals are required from the Board to erect communications equipment (such as aerials, antennas and transmitters), vacation cabins, and concession facilities. Activities requiring permits from DLNR include limited camping, lodging (e.g., private and State cabins), fresh-water fishing, and hiking on certain trails. Uses allowed without a permit include limited collecting of renewable products (fruits, berries, flowers, seeds, and pine cones) for personal use; hiking on most trails; picnicking; and mountain biking (unless posted signs indicate otherwise).

Within Maui County, Maui and Moloka'i both feature State parks. The following State parks are located on Maui:

— Wainapanapa State Park: this 122-acre State Park is located on the eastern most part of the island encompassing remote, wild, low-cliffed volcanic coastline. Activities allowed in the park include lodging, camping, picnicking, shore fishing and hiking.

— 'Iao Valley State Park: this 6.2-acre State Park is located in 'Iao Valley in the western portion of the island. It has a scenic viewpoint of the 'Iao Needle, an erosional feature which abruptly rises 1,200 feet from the valley floor.

— Polipoli Spring State Park: this ten-acre State Park is at 6,200 feet elevation in Kula Forest Reserve. Activities allowed in the park include camping, lodging, and limited hunting

Moloka'i has one State park:

— Pala'au State Park: located at the end of Kalae Highway in north Moloka'i, Pala'au State Park contains a scenic overlook to Kalaupapa National Historical Park. The park offers picnicking and camping in an ironwood grove, and a short trail within the Park that leads to a stone believed to enhance fertility.

2.d.(6) State Trail and Access Program

The purpose of the State Trail and Access Program is to preserve and perpetuate the integrity, condition, naturalness and beauty of State trails and surrounding areas, and to protect environmental resources (Hawai'i Revised Statutes, Sections 198D-11 and 198D-6).

Activities allowed under this program by permit from DLNR include camping, hunting and fishing. Some trails are specified for commercial activity (e.g., commercial hikes on designated trails), but no commercial activity is permitted on a trail if it will compromise the quality and nature of the experience or cause any damage to the integrity or condition of the trail or the surrounding environment. Prohibited uses include collecting, removing, injuring or killing a plant or animal; and introducing plants or wildlife.

2.d.(7) Natural Area Partnership (NAP) Program

Under the Natural Area Partnership (NAP) program, the State provides two-thirds of the management costs for private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. The NAP program can support a full range of management activities to protect, restore, or enhance significant native resources or geological features.

To qualify, the applicant must be a landowner or manager of private lands of high natural area quality. Other requirements include: (1) permanent dedication of the private lands through a transfer of fee title or a conservation easement to the State or a "cooperating entity" such as The Nature Conservancy of Hawai'i, and (2) management of the lands according to a detailed management plan approved by the Board of Land and Natural Resources. A "cooperating entity" is a private non-profit landholding organization or any other body deemed by DLNR to be able to assist in the management of natural areas.

NAP program funding is used to manage Waikamoi and Kapunakea Preserves and Pu'u Kukui Watershed Management Area in Maui; Kamakou, Mo'omomi, and Pelekunu Preserves in Moloka'i; and Kanepu'u Preserve in Lana'i. These areas are discussed more in detail later in the chapter under the "Other Land Management" section.

3. STATE SPECIES PROTECTIONS

3.a. Protection of Threatened and Endangered Wildlife and Ecosystems

The State has established various laws and administrative rules to protect threatened and endangered wildlife and their ecosystems. The Administrative Rule "Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds," implements a State act that was specifically designed to conserve, manage, protect and enhance indigenous wildlife, endangered and threatened wildlife, and introduced wild birds (Hawai'i Administrative Rules, Chapter 13-124). The State list of threatened and endangered species includes by reference species on the Federal list.

With regard to threatened and endangered wildlife species, prohibited activities include *taking*, possessing, processing, selling, offering for sale, or transporting these species. Nor can their nests be removed, damaged or disturbed, or their young, eggs, dead body or skin be removed from

the State of Hawai'i. Nor does DLNR issue permits to destroy or otherwise control threatened or endangered species of wildlife or introduced wildlife. However, these rules do not apply to authorized employees of DLNR, the State Department of Agriculture, and the Service if the employees are acting in the course of their official duties. Also, "incidental *takes*" are allowed subject to approved habitat conservation plans and safe harbor agreements (Hawai'i Revised Statutes, Chapter 195D).

Similarly, the State has established various laws and administrative rules to protect threatened and endangered plants and their ecosystems, which in turn helps protect wildlife. The Administrative Rule "Threatened and Endangered Plants," implements a State act that was specifically designed to conserve, manage, protect and enhance native threatened and endangered plants (Hawai'i Revised Statutes, Sect. 195D). Prohibited activities include the taking, selling, delivering, carrying, shipping, transporting, or exporting of any native endangered or threatened plant. However, license holders may sell such plants if the plants are garden-grown. And "incidental *takes*" are allowed subject to approved habitat conservation plans and safe harbor agreements (Hawai'i Revised Statutes, Chapter 195D).

As discussed above, additional protections of threatened and endangered wildlife and ecosystems are embedded in separate laws governing the State Conservation District, State Forest Reserves, State parks, and designated State trails. Also, the State has laws to protect, conserve and preserve ecosystems in NARs, as well as native ecosystems and important watersheds in State Forest Reserves. Under the NAP program, the State shares in the land management costs of private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. Limited taking of flora is allowed, but only in State parks and State Forest Reserves, and only if the flora is not endangered or threatened. In State parks, collecting or gathering reasonable quantities of natural renewable products–such as fruits, berries, flowers, seeds, and pine cones–is allowed for personal use without a permit. In Forest Reserves, limited colleting for personal use (e.g., *ti* leaves and bamboo) and limited commercial harvesting (e.g., timber, seedlings, greenery and tree ferns) is allowed by permit. Commercial forestry operations are allowed only with approval of the Board.

3.b. State Environmental Assessments and Environmental Impact Statements

Hawai'i State law calls for efforts to prevent or eliminate damage to the environment and biosphere and to protect endangered species and indigenous plants and animals. To meet this and other goals, Hawai'i's Environmental Impact Statement (EIS) law (Hawai'i Revised Statutes 343), which is administered by the State Office of Environmental Quality Control (OEQC), requires that an Environmental Assessment (EA) and/or EIS be prepared for many development projects. The law requires that government give systematic consideration to the environmental, social and economic consequences of proposed development projects before granting permits for construction. For impacts on biological resources, OEQC guidelines call for biological surveys, an ecosystem

impact analysis, and proposed mitigating measures. The requirements and guidelines apply to development projects in the State Agricultural, Urban, Rural and Conservation Districts.

4. COUNTY LAND MANAGEMENT

While the State manages land in the Conservation District, the counties have primary management responsibility for land in the other three State Districts: Agricultural, Urban and Rural. Also, development along the shoreline is subject to county regulation, even for land in the Conservation District.

4.a. Agricultural District

The Agricultural District includes "good" farm land and, from an agricultural perspective, land that is commonly referred to as "junk" land because it is unsuitable for farming or ranching. "Junk" land includes gulches, steep hillsides, rocky land and, on Maui and the Big Island, even relatively recent lava flows having little or no topsoil. This districting of "junk land" into the Agricultural District reflects the fact that this district is a catch-all category that includes all lands not otherwise categorized, regardless of the agricultural quality of the land.

Crops, livestock and grazing are permitted in the Agricultural District, as are accessory structures and farmhouses. Although land in the Agricultural District is not meant to be urbanized it is, in practice, sometimes used for large-lot subdivisions.

Listed species are found in some parts of the Agricultural District, particularly in gulches, on hillsides, and on some of the land that is used for low-intensity grazing. In many cases, the fact that the land is in the Agricultural District indirectly protects listed species by limiting urban sprawl.

4.b. Rural and Urban Districting

The State Urban and Rural Districts in each county are subject to county land use and development (commercial, industrial, residential, etc.) regulations, including county community plans, zoning, and building code regulations.

4.c. Coastal Zone Management Program and Special Management Areas

As mandated by Hawai'i Coastal Zone Management program, the county has an additional layer of regulation that provides special controls on development in Special Management Areas (SMAs) located along the shoreline. Development in an SMA requires an SMA Use Permit from the county where the development is proposed. The intent is to avoid the permanent loss of valuable resources and to ensure adequate access to beaches, recreation areas and natural reserves (Hawai'i Revised Statutes, Chapter 205A). Although SMAs are defined to include all lands extending not fewer than 100 yards inland from the shoreline, counties can amend their boundaries to achieve

certain Costal Zone Management objectives. Amendments removing areas from an SMA are subject to State review for compliance with the coastal law.

4.d. County Boards of Water Supply

Boards of Water Supply in each county own and manage land in their island watersheds in order to protect their county's supply of water. Watersheds generally include mountainous areas.

5. OTHER LAND MANAGEMENT

Other land management activities that are not the responsibility of the State or county governments are discussed below.

5.a. Preserves Involving The Nature Conservancy of Hawai'i (TNCH)

The Nature Conservancy of Hawai'i (TNCH) is a private, non-profit affiliate of a national organization that works with Federal, State and private partners to protect Hawai'i's natural areas that shelter native species. The mission of TNCH is to preserve Hawai'i's native plants, animals, and natural communities by protecting the lands and waters needed for their survival. In managing the preserves TNCH often takes advantage of Hawai'i's NAP program whereby the State provides two-thirds of the cost of managing private land dedicated to conservation (see discussion of NAP in Section 2.d.).

Management goals for the preserves include some or all of the following: (1) control non-native species; (2) suppress wildfire; (3) restore the integrity of dryland forest ecosystem; (4) reduce damage caused by feral ungulates and small mammals; and (5) prevent extinction of rare species in the preserves. General management actions taken to attain the aforementioned goals include various fencing; monitoring and researching native plant species; hunting to control ungulate population; controlling weeds; and other various programs to prevent wildfire, control non-native plants, etc. Brief descriptions of the preserves in Maui County with TNCH involvement are presented below.

Maui maintains the following preserves:

— Waikamoi and Kapunakea Preserves

Waikamoi Preserve on the northeast flank of Haleakala is a 5,230-acre sanctuary for hundreds of native Hawaiian species and a vital watershed for Upcountry Maui. The Haleakala Ranch Company conveyed the management rights to TNCH in 1983. The 1,264-acre Kapunakea Preserve in the West Maui Mountains was established in 1992 when Amfac/JMB Hawai'i, Inc. granted TNCH a perpetual conservation easement over the area.

— Pu'u Kukui Watershed Management Area

Located on the West Maui Mountains and owned by Maui Land & Pineapple Co., Ltd., the 8,600-acre Pu'u Kukui Watershed Management Area (WMA) is the largest single private nature preserve in Hawai'i. Seven listed species are known to exist in this WMA.

Moloka'i maintains the following preserves:

— Pelekunu Preserve (5,714 acres)

Located along Moloka'i's extremely rugged north coast, featuring the tallest sea cliffs in the world, Pelekunu Preserve protects one of Hawai'i's last remaining free-flowing streams. The Preserve is also home to at least seven native aquatic species. The land is owned by the Nature Conservancy, who purchased the land primarily from Moloka'i Ranch, Ltd. in 1987.

— Kamakou Preserve (2,274 acres)

Kamakou Preserve is a lush rain forest located in the mountainous interior of East Moloka'i near the summit of the island's highest mountain. The Preserve contains 37 rare plant species, of which 18 are listed as federally endangered, and contains habitat for five native forest birds and five rare native land snail species. It is also home to countless native insects, snails, and a unique array of birds. The land is owned by Moloka'i Ranch, Ltd., which, in 1982, granted a conservation easement to TNCH to restore the area and protect it in perpetuity.

— Mo'omomi Preserve (921 acres)

The Mo'omomi Preserve is located on the northwest coast of West Moloka'i. Its windswept dunes shelter more rare coastal native grasses and shrubs than any other single place in the main Hawaiian islands, as well as nests of the endangered green sea turtle and sites of Hawaiian prehistory, paleontology and geology. The Preserve was created in 1988 on land purchased by TNCH.

Lana'i maintains one preserve:

— Kanepu'u Preserve

The 590-acre Kanepu'u Preserve, in the northwest central portion of the island on its western plateau, contains the largest remnants of Hawai'i's extremely rare *olopua/lama* dryland forest and is home to 49 plant species found nowhere else in the world. The Kanepu'u Preserve contains the Kanepu'u Trail, which has eight stations with interpretive signs describing particular features of natural or cultural significance in the Preserve. The Service reports one listed plant species in this Preserve.

The area has been protected since 1918, when George Munro (a naturalist and rancher) worked to slow the erosion that had already removed much of the topsoil from the western plateau. Over 30 years, Munro removed feral pigs, planted windbreaks, and erected fences to protect *lama* (native ebony) and *olopua* (native olive) from introduced cattle, pigs, sheep, and axis deer. Munro's legacy was carried forth by Hui Malama Pono O Lana'i, a community group that remains active in managing the area. In 1991, Castle & Cooke granted a conservation easement to TNCH to continue to restore the forest and ensure its long-term protection.

5.b. Watershed Partnerships

5.b.(1) Maui Watershed Partnerships

Maui has two Watershed Partnerships—the East Maui Watershed Partnership (EMWP) covering about 100,000 acres of watershed, and the West Maui Mountains Watershed Partnership (WMMWP) of about 50,000 acres. These large areas include all or most of Haleakala National Park, the Protective and Limited Subzones of the Conservation District, State forest reserves, State NARs, the Manawainui Plant Sanctuary, State-managed hunting units, State trails, the portion of the West Maui watershed managed by the county Board of Water Supply, the private Waikamoi and Kapunakea Preserves (see above), the private Pu'u Kukui Watershed Management Area (see above) and, for the EMWP, considerable land in the Agricultural District.

Members of the EMWP include DLNR, the Federal government (the National Park Service), TNCH and private landowners. The WMMWP has members from the State, TNCH, the Maui County Board of Water Supply, and private landowners.

Participants in the Watershed Partnerships pool their expertise and other resources to implement an active watershed management program with the basic objective being to protect the watershed ecosystems in perpetuity. Watershed management programs include water and watershed resource monitoring, pest animal control, weed control, public education and awareness, and

management of infrastructure improvements. Planned activities in West Maui include installation of 58 strategic fences, removal of ungulates above the fences, reduction in ungulate populations below the fences, and control of invasive weeds.

5.b.(2) Moloka'i: East Moloka'i Watershed Partnership

Moloka'i's sole watershed partnership, the East Moloka'i Watershed Partnership (EMWP), was formed in late 1999. It encompasses about 22,000 acres extending from the mountainous interior of East Moloka'i down to both the north and south shorelines. The area includes the Kalaupapa Historical National Park, the island's two NARs, Pelekunu and Kamakou Preserves (see above), and State-managed hunting units. The area encompasses considerable land in the Conservation and Agriculture Districts and a small amount of land in the Urban District.

Membership in the EMWP includes private landowners (Kamehameha Schools, Kapualei Ranch), the State DLNR Division of Forestry and Wildlife, TNCH, Maui County, the Maui Board of Water Supply, Ke Aupuni Lokahi Enterprise Community Governance Board (a grassroots community organization), and Federal agencies (the National Park Service, the Environmental Protection Agency, NRCS, the U.S. Geological Services, and the Service).

The main focus of the partnership is to protect and enhance high-quality native Hawaiian rain forest communities. Using the traditional *ahupua'a* (i.e., Hawaiian land division) approach to dividing land for resource management, watersheds are to be protected from the mountain-top to the sea. Participants in the EMWP share expertise and provide funding and other resources to implement an active watershed management program designed to maintain and increase the watershed capacity and reduce erosion. Upper elevations (above 3,500 feet) are to be kept free of feral animals by installing contour fencing. At mid-elevations (1,000 to 3,500 feet), goat populations are to be reduced to allow recovery of vegetation. Also, a monitoring system will be established to help with long-range planning.

The initial focus of EMWP's efforts will be the Kamalo/Kapualei watershed project on the south side of the island. The goal of this project is to protect and restore 2,000 acres of native rainforest and shrub land by fencing and removing feral goats and pigs from the upper elevations. An existing five mile long fence may be extended in both east and west directions as neighboring landowners agree to participate.

5.b.(3) Lana'i: Lana'ihale Watershed Partnership

The summit of Lana'i's only mountain, Lana'ihale, is the home of a valuable watershed for Lana'i's aquifer. It is estimated that about 50 percent of the water in the Lana'i aquifer comes not from rain but from "fog drip", which occurs when the trees and ferns in the upper regions of the mountain rake moisture from passing clouds. Many of the trees and plants in the summit region were started from seedlings 100 years ago by George Munro.

Over the years ungulates—first sheep, then goats and cattle—eroded gullies and damaged this watershed. In recent years, axis deer have begun chewing on saplings, rubbing away bark on older trees, and grazing on grass and shrubs that would otherwise help hold the soil.

Realizing the importance of the watershed to the island of Lana'i, Castle & Cooke, in partnership with the Service, NRCS, DLNR and other agencies discussed above, has embarked on a 10-year program to rebuild the forest, restore the watershed, and protect native plants and their habitats. The cost is estimated at about $1.5 million over ten years, half of which is to be provided by the Federal and State agencies and half by Castle & Cooke. The plan is to (1) fence off 3,580 acres at Lana'ihale summit in three sections; (2) conduct a public hunt to rid each area of axis deer; and (3) plant native plants and thousands of trees.

5.c. National Tropical Botanical Gardens

The National Tropical Botanical Garden (NTBG) is dedicated to the conservation of tropical plant diversity, particularly rare and endangered species. Within Maui County, the NTBG operates one garden on Maui.

The 122-acre Kahanu Garden is on the Hana coast along the far eastern shores of Maui. Concentrating on plants of value to the people of Polynesia, Micronesia and Melanesia, Kahanu Garden has the world's largest collection of breadfruit and also contains the massive Pi'ilanihale Heiau, which is believed to be the largest ancient place of worship in Polynesia. The garden is surrounded by an expansive native pandanus forest.

5.d Kaho'olawe: Kaho'olawe Island Reserve

Used as a bomb target by the U.S. Department of Defense (DoD) for many years, the management and use of Kaho'olawe has changed significantly in the recent past. In late 1990, DoD stopped using Kaho'olawe for bombing and target practice. Further, the U.S. Navy has cleared 10,000 acres of surface ordnance and eradicated the population of introduced goats. Also, soil conservation and revegetation programs were instituted to restore and revive the environment. In 1993, the Hawai'i State Legislature established the Kaho'olawe Island Reserve to protect the entire island and surrounding coastal waters extending two miles seaward, and established the Kaho'olawe Island Reserve Commission (KIRC) under Native Hawaiian control to manage the island. In 1994, the U.S. Navy signed a deed returning Kaho'olawe to Hawai'i.

By Hawai'i law, the Kaho'olawe Island Reserve is to be used solely and exclusively, in perpetuity, for: (1) the preservation and practice of all rights customarily and traditionally exercised by Native Hawaiians for cultural, spiritual, and subsistence purposes; (2) the preservation and protection of the Reserve's archaeological, historical, and environmental resources; (3) rehabilitation, revegetation, habitat restoration, and preservation; and (4) education. Commercial uses are strictly prohibited in the Reserve.

Congress authorized $400 million to clean the island and restore its cultural and natural resources. The entire island is being cleared of surface ordnance to be reasonably safe for human access. Selected areas will be cleared for specific uses including revegetation with native species, trails and roads, cultural sites, camping areas, and educational facilities.

The U.S. Navy is consulting with the Service under section 7 of the Act to ensure the protection of threatened and endangered species during the ordnance clearing activities. However, the KIRC's 1998 environmental restoration plan for Kaho'olawe does not address specific management actions to protect and conserve endangered plant species.

APPROACH TO THE ECONOMIC IMPACT ANALYSIS[11] CHAPTER V

This chapter presents the approach used in Chapter VI to estimate the economic impacts of the section 7 listing and critical habitat provisions of the Act on projects, land uses and activities in proposed critical habitat for particular species. First, the scope of the economic analysis is described. This is followed by a discussion of the analytical concepts and steps used to conduct the analysis.

1. SCOPE OF THE ANALYSIS

The parameters below define the scope of the economic analysis.

1.a. Time Horizon for the Analysis

A 10-year time horizon is used because many landowners and managers do not have specific plans for projects beyond 10 years. In addition, the forecasts in this analysis of future economic activity are based on current socioeconomic trends and the current level of technology, both of which are likely to change over the long term.

1.b. Projects, Land Uses and Activities Subject to Analysis

The analysis focuses primarily on the "reasonably foreseeable" projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units. In turn, these are the activities that could be affected by the critical habitat designation.

"Reasonably foreseeable" projects, land uses, and activities are defined for the purposes of this report as those which are (1) currently authorized, permitted, or funded; (2) proposed in plans

[11] **Note to Reader:** Readers who are already familiar with the approach to the analysis may wish to skip this chapter and proceed to the economic analysis in Chapter VI.

currently available to the public; or (3) projected or likely to occur within the next 10 years based on (a) recent economic or land-use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land-use controls, access, terrain, infrastructure, and other restrictions on development. Current and future activities that could potentially result in section 7 consultations and/or project modifications are considered to be reasonably foreseeable.

2. ANALYTICAL CONCEPTS AND STEPS

The approach used to estimate the economic impacts on specific projects, land uses and activities in areas proposed for critical habitat involved, as appropriate, the analytical concepts and steps described below.

2.a. Background Information

In order to provide context for the analysis, and to the extent that information was reasonably available, background information was obtained on projects, land uses, and activities that may potentially be affected by the proposed designation. Depending upon the situation, this background information included some or all of the following: (1) the location of a project, land use, or activity; (2) a description of the project, land use, or activity, including its magnitude; (3) the amount of economic activity associated with the project, land use, or activity (e.g., revenues and employment); (4) past section 7 consultations, project modifications and associated costs; and (5) whether the project site is within the geographic area known to be *occupied* by listed species other than those in the current proposal.

2.b. *Federal Involvement*

For the current and planned projects, land uses, and activities that may affect the physical and biological features of the proposed critical habitat units, the next step in the analysis was to determine *Federal involvement*. As discussed in Chapter III, Federal agencies must consult with the Service whenever an activity they fund, authorize, or carry out may affect designated critical habitat. When consultations concern an activity on Federal lands, the relevant Federal agency consults with the Service. When consultations involve an activity proposed by a State or local government or by a private entity, the Federal "Action agency" to the activity consults with the Service.

Activities on State, county, municipal and private lands that do not have a *Federal nexus* (i.e., they do not involve Federal funding, a Federal permit, or other Federal actions) are not restricted by critical habitat designation. Therefore, these activities were not addressed further in the analysis.

In practice, not every single project, land use, and activity that has a *Federal nexus* has been subject to section 7 consultation with the Service. Thus, the analysis was further confined to those projects, land uses, and activities which are, in practice, likely to be subject to consultation. This

assessment was based on a review of past consultations, current practices, and the professional judgments of Service and other Federal agency staff.

2.c. Exclusion of Man-made Features and Structures

In practice, the critical habitat provisions of section 7 do not apply to the operation and maintenance (O&M) of existing man-made features and structures because these features and structures normally do not contain, and are not likely to develop, any *primary constituent elements.* Examples of man-made features and structures include buildings, roads, aqueducts, telecommunications equipment, arboreta and gardens, and *heiau* (indigenous places of worship or shrines). As a result, O&M of man-made features and structures were not considered further in the analysis.

An equivalent interpretation is that existing man-made features and structures are unmapped holes that are within the boundaries of a critical habitat unit, but are not part of the unit.

2.d. Existing Protections

The next step in the analysis involved identifying the impacts on activities that were expected to result from existing protections unrelated to section 7 (e.g., other existing Federal, State, and county land-use controls and environmental protections). If some other existing statute, regulation, or policy limits or prohibits a project, land use, or activity, the economic impacts associated with those limitations or prohibitions are not attributable to section 7 listing provisions and/or critical habitat provisions. For example, State protections include land-use restrictions for activities in the State Conservation District and specific protections of threatened and endangered species and their ecosystems.

2.e. Consultations and Project Modifications

For current and planned projects, land uses, and activities that are likely to be subject to consultations under section 7 of the Act, the next step in the analysis was to estimate (1) the quantity and nature of the consultations (e.g., formal or informal); and (2) changes that are likely to occur in such items as project designs, schedules, land uses, activities and programs.

The estimates reflect the availability of information which, in many cases, was limited (e.g., the outcome of future consultations will not be known until they occur).

2.f. Economic Costs

The next step in the analysis was to estimate the costs of consultations and the changes to projects, land uses and activities prompted by implementing the section 7 provisions. The types of economic costs that were considered included, but were not limited to, changes in revenues, costs,

and property values. The analysis then determined what proportion of those section 7-related costs were attributable solely to the critical habitat provisions of section 7 (as opposed to the listing provisions).

2.g. Qualitative Impacts

In some cases, costs were described but were not quantified for one or more of the following reasons: (1) the economic impacts attributable to both the species listing and the critical habitat are expected to be small; (2) the probability that the impacts will occur is small; (3) the impacts are highly speculative; or (4) data needed to quantify impacts are not reasonably available.

2.h. Economic Benefits

The final step in the analysis was to estimate the benefits (e.g., species preservation) associated with the section 7 listing and critical habitat provisions. In most cases, a qualitative discussion of benefits is provided because market prices or existing economic studies on which to base values are not available (e.g., the economic value of preserving certain species).

3. SOURCES OF INFORMATION

The approach described above relied primarily on information provided by the Service (GIS map overlays, acreage tables, public testimony and comment letters on prior critical habitat proposals, etc.); the State Department of Land and Natural Resources (DLNR); the State Department of Business, Economic Development & Tourism (DBEDT); county planning and finance departments; other Federal, State and county agencies; the private landowner and land managers; affected companies; and other interested parties. Public documents used included the proposed rule (including the preamble), *Hawai'i Revised Statutes* and *Hawai'i Administrative Rules* related to land use, *The State of Hawai'i Data Book,* applicable county land-use plans, and property tax data.

ECONOMIC COSTS AND BENEFITS **CHAPTER VI**

1. INTRODUCTION

As noted in the Preface, the Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of inclusion. To aid in this determination, this chapter presents an analysis of the section 7-related economic costs and benefits associated with listing the plants as threatened and endangered species and with designating critical habitat for the plants. However, the Service cannot exclude an area from critical habitat designation if it determines that the exclusion will result in the extinction of the species.

As explained in Chapter V, the approach used in this economic analysis involves estimating both (1) the total section 7-related economic costs and benefits (also referred to as economic impacts) of the plant listings and critical habitat designation, and (2) the subset of these costs and benefits that is solely attributable to critical habitat designation. As a result, for each potential impact, the analysis presents two estimates:

— **Total Section 7 Costs and Benefits.** These estimates include the economic impacts likely to occur from implementing both the species listing provision and the critical habitat provision of section 7 of the Act.

— **Costs and Benefits Attributable to Critical Habitat.** These estimates represents those portions of the section 7-related economic impacts that are most likely attributable to the proposed critical habitat designation but not to the plant listings.

The discussion and analysis of costs and benefits in this chapter is divided into the following sections: section 7 consultation history and typical costs (Section 2), direct section 7-related costs (Section 3), indirect costs (Section 4), potential impacts on small entities (Section 5), and section 7-related economic benefits (Section 6). A summary of the direct and indirect costs and benefits is

given in Section 7. For some land-use activities and projects, the designation of critical habitat may generate both direct and indirect costs, or both costs and benefits, etc. As a result, the analysis of economic impacts for some land-use activities and projects is split among two or more sections, as appropriate.

2. SECTION 7 CONSULTATION HISTORY AND TYPICAL COSTS

In order to provide a context for the analysis in Section 3 below, this section gives a summary of the past consultations and project modifications that concerned one or more of the listed plants. It also presents the costs generally associated with section 7 consultations, biological surveys and associated project modifications. This information is used in Section 3 below to estimate future section 7-related economic impacts.

2.a. History of Section 7 Consultations and Project Modifications

Service records indicate that from the time the plants were listed between 1991 and 1999 until critical habitat was proposed, the Service conducted several informal but no formal section 7 consultations regarding projects and activities in the proposed critical habitat. The informal nature of these consultations primarily reflects a lack of economic activity with *Federal involvement* in the area.

2.b. Cost of a Typical Section 7 Consultation, Biological Survey and Project Modification

2.b.(1) Focus of Consultation

For the plants, the proposed rule indicates that future section 7 consultations are likely to focus on projects and activities that could directly or indirectly adversely affect critical habitat, including:

— Activities that appreciably degrade or destroy the *primary constituent elements* for the plants including the following: overgrazing; maintaining feral ungulate levels; clearing or cutting native live trees and shrubs (e.g., woodcutting, bulldozing, construction, road building, mining, herbicide application); introducing or enabling the spread of non-native species; taking actions that pose a risk of fire, etc.

— Activities that alter watershed characteristics in ways that would appreciably reduce groundwater recharge or alter natural, wetland, or vegetative communities. Such activities include new water diversions or impoundment, excess groundwater pumping, and manipulation of vegetation through activities such as the ones mentioned above.

— Rural residential construction that includes concrete pads for foundations and installing septic systems.

— Recreational activities that appreciably degrade vegetation

— Mining sand or other minerals.

— Introducing or encouraging the spread of non-native plant species.

— Importing non-native species for research, agriculture, and aquaculture, and releasing biological control agents.

2.b.(2) Cost of Consultation

As discussed in Chapter III, participants in a consultation may include the Service, the Federal Applicant or Federal Action agency, and possibly a non-Federal applicant. Although the Service does not charge fees for its consultations, participants in consultations normally spend time assembling information about the site and their proposed project or activity; preparing for one or more meetings; participating in meetings; arranging for biological surveys and any associated reports; and responding to correspondence and phone calls.

For three levels of complexity ("Low", "Medium" or "High"), Table VI-1 gives the estimated cost to those participating in consultations with the Service. The estimate is based on: (1) a review of consultation records across the country related to other critical habitat rulemakings; (2) the typical amount of time spent by all participants; and (3) the relevant standard hourly rates and overhead allowances for the Service, other Federal agencies, and private applicants in Hawai'i.

Table VI-I
ESTIMATED COST OF A SECTION 7 CONSULTATION

Item	**Low**	**Medium**	**High**
Consultation			
Federal Action Agency or Federal Applicant	$2,200	$6,400	$10,700
U.S. Fish and Wildlife Service	$1,600	$5,100	$10,000
Total for Federal Agencies	**$3,800**	**$11,500**	**$20,700**
Non-Federal Applicant (if any)	$1,400	$4,200	$8,200
Total (if a Non-Federal Applicant)	**$5,200**	**$15,700**	**$28,900**
Source: Project consultants and U.S. Office of Personnel Management, 2002 General Schedule Salary Table.			

As indicated in the table, consultation costs could range from as little as $3,800 to as much as $20,700 if just Federal agencies are involved, and from $5,200 to $28,900 if there is a non-Federal applicant.

2.b.(3) Cost of Biological Surveys

For a particular parcel, the cost of a biological survey and a technical report on the findings varies according to a number of parameters:

— Size of the parcel: The consultation history for a variety of listed plants suggests that projects are of three sizes: small (fewer than ten acres), medium (11-100 acres), or large (101-500 acres). Large parcels take longer to survey and thus are more costly to survey.

— Ease of access to the parcel: Some parcels can be reached easily while others can be reached only by helicopter. More remote parcels are more costly to survey.

— Type of ecosystem: Forested areas are more difficult to survey than open areas and therefore are more costly to survey.

Based on these parameters, Table VI-2 presents estimates of the cost to survey parcels with different combinations of features and to prepare the report on the findings. The estimates assume the following: (1) a three-person team can survey 100 acres in one day if the area is open, and 30 acres if it is forested; (2) sites having "easy" access can be reached in an hour of driving or hiking, "medium" access takes 2 hours, and "difficult" access takes a half-hour by helicopter; (3) biologist and field-assistant services are $50 to $80 per hour; (4) survey team travel costs are $1,000 to $1,500 for round-trip airfare from O'ahu, car rental, and per diem; and (5) helicopter time is $700 per hour.

Table VI-2
ESTIMATED COST OF BIOLOGICAL SURVEYS FOR THREATENED AND ENDANGERED PLANTS

Size and Location	Accessibility		
	Easy	Medium	Difficult
10 Acres, Open or Forested Area	$3,700	$3,900	$5,100
100 Acres, Open Area	$4,500	$4,900	$5,900
100 Acres, Forested Area	$10,200	$11,400	$14,900
500 Acres, Open Area	$15,900	$17,700	$22,900
500 Acres, Forested Area	$44,600	$50,600	$67,900

Source: Project consultants. Based on discussions with a Hawai'i-based biological consulting firm in 2002.

As Table VI-2 indicates, the costs of a biological survey could range from as little as $3,700 in a 10-acre, easily accessible, open area to as much as $67,900 in 500-acre, remote, forested area. The estimates are based on average projects of each type; specific projects of each type may require more or less survey effort than the average used in the cost estimates, depending on the characteristics.

2.b.(4) Costs of Project Modification

As discussed in Section 2.a. above, no formal consultations regarding the listed plants have yet occurred, and the informal consultations did not result in significant project modifications. Thus, project modification costs are determined on a project-by-project basis and are not based on standardized costs of typical project modifications.

3. DIRECT SECTION 7-RELATED COSTS

3.a. Excluded Areas, Features and Structures

As mentioned in Chapter I, the Service has indicated that certain areas in the proposed critical habitat do not contain the *primary constituent elements* for the listed plants. For this reason, they are not included in the economic analysis. Also, the manmade features and structures listed in Chapter I are not considered in the economic analysis.

3.b. Management of Game Hunting

Presented below is an analysis of the direct economic impacts of the proposed critical habitat designation on the management of game hunting on State lands. Additional impacts are addressed in Section 4, "Indirect Costs," while Appendices VI-A and VI-B provide background information on hunting and game-mammal management.

3.b.(1) Affected Hunting Acreage

All or portions of five of the eight proposed critical habitat units overlap with State-managed hunting lands. These overlapping areas, approximately 4,747 acres of land (or 24 percent of the total area proposed as critical habitat), represent about 16 percent of the total State-managed hunting units on Lana'i.

3.b.(2) Direct Economic Impacts on Game-Management Projects

Potential Project or Activity, Next Ten Years: Game management and hunting-related projects.

Based on a statewide consultation on hunting in 2001 (see Appendix VI-A), these projects may include maintenance or construction of a hunter check-in station and watering units; leasing land for game mammal production; and game mammal surveys.

Federal Involvement: Federal cost-sharing of many DLNR game-management projects.

The *Federal nexus* is the Federal funding provided by the Service to DLNR to restore and rehabilitate wildlife habitat and to support wildlife management research. The funding is provided as part of the Pittman-Robertson Act (see Appendix VI-A, Section 7).

Presence of Other Listed Species: None

Future Consultation and Cost:

- Total Section 7 Costs: $30,000

Consultations involving DLNR will be required on game-management projects that are partially funded under the Pittman-Robertson Act and which affect listed species or critical habitat. No consultations are required for Pittman-Robertson projects that do not affect listed species or their habitats; projects that are entirely funded by the State (even if they do affect listed species or their habitats); or projects by private parties on privately owned land.

Because of the *Federal nexus* and the presence of listed plants throughout some of the State hunting lands, internal Service consultations already take place on game-management projects that are partially funded under the Pittman-Robertson Act. However, if the proposed critical habitat is designated, the scope of future section 7 consultations will be expanded to include portions of the critical habitat where no listed species are present.

Statewide consultations between DLNR and the Service occur every five years, and the last consultation took place in year 2001. Most of the projects submitted for Pittman-Robertson funding were approved with the decision that these projects are not likely to adversely affect listed species in the area. However, the Service recommended that DLNR proceed to formal consultation for the proposed projects on the State-managed hunting units in Lana'i. In response, DLNR chose to withdraw the projects from Lana'i entirely (see Appendix VI-A, Section 8 for more details). However, DLNR is planning to pursue Pittman-Robertson funding again for the Lana'i projects (personal communication with DLNR, February 2002). Given the result of the most recent consultation, and the fact that DLNR has not indicated that it has altered any of its proposed

projects, this analysis makes the conservative assumption that the reinitiation is likely to result in a formal consultation.

During the reinitiation, the Service will reevaluate whether the projects can proceed without change, or can proceed with "reasonable and prudent" measures. The latter occurs when the Service determines that the project, as modified, will not *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* its habitat. This analysis assumes that the reinitiation of consultation will cost as much as it did for the original consultation in 2001. The 2001 consultation cost the Service and DLNR a total of about $27,600. Given that State-managed hunting units in Lana'i represent about three percent of the entire State-managed hunting units in Hawai'i, it is estimated that approximately $800 was spent addressing Lana'i issues ($27,600*.03). However, the reinitiation must address areas that have not been previously considered before the critical habitat designation. This analysis makes a conservative assumption that the cost of the initial 2001 consultation–i.e., $800–only addresses the fraction of the hunting units that overlaps with the *occupied* proposed critical habitat (i.e., eight percent of the proposed critical habitat area). Therefore, the total costs associated with the reinitiation of consultation are estimated at $10,000 ($800/.08).

As mentioned above, statewide consultations between DLNR and the Service occur every five years. Therefore, two programmatic consultations are likely over the next ten years in addition to the reinitiation of the 2001 consultation. The cost of each programmatic consultation for Lana'i is likely to be similar to the cost associated with the 2001 consultation, or $800–i.e., $1,600 for the next ten years. However, as mentioned above, designation of critical habitat may increase this cost. Therefore, estimated cost of the two programmatic consultations within the next ten years increases to $20,000 ($1,600/.08).

In sum, total section 7 costs are $30,000: $10,000 for the reinitiation and $20,000 for the next two programmatic consultations.

C Costs Attributable to Critical Habitat: $28,000

Without the critical habitat designation, there would be no need for reinitiation of the 2001 consultation, and the costs for the two programmatic consultations in the next ten years are estimated at $1,600 ($800*2). Thus, the difference between the total section 7 cost ($30,000) and the cost associated with the listing ($1,600) would be attributable to the proposed critical habitat.

Anticipated Project Modification and Cost:

C Total Section 7 Costs: $2.4 million

This analysis makes the conservative assumption that the reasonable and prudent measures will involve the most costly project modification: exclosure fencing (personal communication with

the Service, February 2002). Depending upon location and terrain, the cost of fencing, including materials and installation, ranges from less than $30,000 per mile for areas that are accessible via a short drive, to as much as $170,000 per mile for remote locations that must be reached by helicopter (based on information from DLNR and the National Park Service). If DLNR were to construct exclosure fences around the critical habitat that overlaps with the State-managed hunting units, about 4,747 acres, it would require approximately 24 miles of fencing. DLNR estimates that the contracted cost of fencing will cost approximately $2.4 million with similar replacement cost approximately every ten years (Letter to the Service from DLNR. March 15, 2002). Once exclosure fences are built, no other significant project modifications are foreseeable within the next ten years.

C Costs Attributable to Critical Habitat: $2.1 million

Absent critical habitat designation, the Service is likely to require exclosure fencing around the areas where the listed plants occur. In this case, approximately three miles of fencing would be required at a cost of approximately $300,000. Therefore, the difference between the total Section 7 cost ($2.4 million) and the cost associated with listing ($300,000) would be attributable to the proposed critical habitat.

However, in a letter to the Service, DLNR has indicated that it would not be able to provide necessary funding to carry out such project modification. Instead, DLNR indicated that the agency is likely to avoid *Federal nexus* by finding alternative non-Federal funds to manage State hunting units in Lana'i. DLNR has also expressed the possibility of shutting down the public hunting program on Lana'i entirely in the worst case scenario where it lacks sufficient alternative funds (Letter to the Service from DLNR, March 15, 2002).

3.c. Conservation Projects

3.c.(1) Partners for Fish and Wildlife Program/ Wildlife Habitat Incentive Program

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. Additional information about the PFW program is provided in Chapter IV.

The Service is currently funding three separate Partnership projects with the private landowner in Lana'i that involve constructing exclosure fences and conducting re-vegetation for the protection of watershed, endangered plants, and snails in Lana'i. Specifically, the Service is funding the construction of the Lana'ihale summit fence, the Awehi Gulch fence, and the cloud forest fence. The Awehi Gulch fence has been completed and is being maintained while the Lana'ihale summit fence and the cloud forest fence are still under review for exact location and appropriate approach

for construction. Since fences are manmade features–i.e. "unmapped holes"–the Awehi Gulch fence is not included in the analysis.

Of the two projects, the Lana'ihale summit fence is much larger in scope and also involves funding from several other Federal, State, and private agencies under the Lana'i Forest and Watershed Partnership. The goal of the project is to protect the forest in the Lana'ihale Watershed, which serves as the main source of water for Lana'i. This project involves constructing a fence that will enclose approximately 3,580 acres in order to keep ungulates out, restoring native vegetation and removing aggressive non-native plant species over the next ten years. The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) is also funding a part of the Lana'ihale summit fence project under the Wildlife Habitat Incentives Program (WHIP), which provides assistance to landowners and lessees to protect and restore Hawai'i's native habitats as well as habitats of threatened and endangered species. Additional information on WHIP is provided in Chapter IV.

The other project–the cloud forest fence–is entirely funded by the Service, and it involves enclosing much smaller areas within the Lana'ihale summit fence.

3.c.(2) Economic Impact on PFW Programs

Potential Activity, Next Ten Years: Fencing projects and their maintenance.

The Lana'ihale summit fence, and the cloud forest fence.

Federal Involvement: Partial and/or entire funding from the Service and NRCS

Presence of Other Listed Species and Critical Habitat for Other Species: possible, depending upon the location of the projects.

Consultations and Costs

Possible reinitiation of consultations

C Total Section 7 Cost: $10,400

The Service has already conducted consultations on the two affected projects. Therefore, reinitiation of consultation, if any, will likely be non-substantive and require a low level of effort. The cost estimate is based on (1) reinitiation of two consultations (funding provided by the Service and NRCS for the Lana'ihale summit fence will be treated as one consultation); (2) the "Low" cost from Table VI-1 of a consultation with a non-Federal agency as the Applicant; and (3) no biological surveys because the Service already conducted surveys during the initial consultations. All of the

consultation costs are conservatively assigned to the listed plants, even though the consultation may also address listed wildlife species that may be present.

C Cost Attributable to Critical Habitat: $10,400

As noted above, the Service has already conducted consultations under the listing of the plants in the project area. Therefore, the cost associated with the reinitiation of consultations is solely attributable to the designation of critical habitat.

Anticipated Project Modifications and Cost: None

These conservation projects are beneficial in nature. Therefore, if any project modifications are involved, they are expected to be extremely minor.

3.d. U.S. Military Activities

3.d.(1) U.S. Marine Corps Aviation Training

The Marine Corps has been conducting night helicopter low-altitude terrain flight (TERF) training in the northwest portion of Lana'i since 1990. TERF training involves maintaining a constant low-altitude flight path following the marked outline of the terrain using night-vision goggles. The license to perform this training has been granted by the private owner of that land for an indefinite time, and the training activities are expected to take place on a continuing basis. The Marine Corps published an Environmental Assessment in August 2001 that addressed the ongoing TERF training on Lana'i and a proposal to initiate confined area landing (CAL) training in the same area. CAL training involves landing two to four aircrafts on predetermined landing zones (LZs) for short intervals. The EA concluded that these activities will not result in any negative impact on the surrounding environment, including the topography and flora population of the region.

The U.S. Navy (the Navy) has consulted with the Service regarding these activities in the past. The consultation indicated the Service's concern that the helicopters might deviate from the predetermined paths and LZs due to human error. However, the Navy indicated that its use of Geographic Positioning System (GPS) assures that the possibility of deviation is remote. Therefore, the Service concurred that these activities are not likely to adversely affect any listed species in the area.

3.d.(2) Economic Impact on U.S. Marine Corps Aviation Training

Potential Activity, next ten Years: Aviation training, including TERF and CAL training.

Federal Involvement: U.S. Navy – Marine Corps

Consultation and Cost

Reinitiation of consultation.

C Total Section 7 Costs: $3,800

The Service has already conducted an informal consultation on the U.S. Marine Corps Aviation Training and determined that the proposed activities are not likely to adversely affect listed species in the area. As a result, the reinitiation of the consultation is likely to be non-substantive and involve a low level of effort. Therefore, the cost estimate is based on the following: (1) reinitiation of a consultation on military training, (2) the "Low" cost from Table VI-1 of a consultation with a Federal Action agency, and (3) no biological survey because the Service already conducted a survey during the initial consultations.

C Cost Attributable to Critical Habitat: $ 3,800

As noted above, the Service has already conducted an informal consultation. Therefore, the cost associated with the reinitiation of consultation is solely attributable to the designation of critical habitat.

Anticipated Project Modifications and Cost: None

Since the Service has already concluded that this project is not likely to adversely affect listed species in the area during the initial consultation, the Service indicates that it is likely to come to a similar conclusion regarding whether the project may affect the proposed critical habitat. If any project modifications are involved, they are expected to be extremely minor.

3.e. Civil Works Program

Under the Civil Works Program, the U.S. Army Corps of Engineers (ACOE) provides services to the public with funds from the annual Energy and Water Development appropriation. The program covers four broad areas: water infrastructure, environmental management and restoration, response to natural and manmade disasters, and engineering and technical services for the Army, other Department of Defense agencies, and other Federal agencies. The process for developing Civil Works projects begins when citizens identify a need for flood protection, navigation, or other water-related infrastructure and petition Congress for help. Congress then may

direct ACOE to do a two-phased study to determine if a project is warranted. First, an initial survey is conducted to determine if a feasible solution is likely. Subsequently, a feasibility study identifies and examines alternatives and selects the project that best meets national and local needs. Before any construction begins, Congress must first authorize the project and then appropriate funds. Most projects are built with a combination of Federal funds and contributions by non-Federal sponsors. Depending on project purposes, ACOE then either operates and maintains the completed project, or turns it over to local authorities (www.usace.army.mil/publi.html).

3.e.(1) Kaumalapau Harbor Navigation Improvements Project

Kaumalapau Harbor is the only commercial harbor in Lana'i, serving as the receiving site for most of the consumer goods, food, and mail that come into the island. However, Kaumalapau Harbor is often forced to close during the winter by wave assault associated with storms approaching from the west and south. The harbor's breakwater has been severely damaged many times by storm waves. Concrete dolosse pilings, conduit, scrap metal, and other debris were placed on the breakwater to reinforce it after many of these events. However, much of this material was displaced after big storms in 1992 and 1993, and has not been repaired since (*Draft Fish and Wildlife Coordination Act Report: Kaumalapau Harbor Navigation Improvements, Lanai, Hawai'i*. August 1995).

The purpose of the Navigation Improvement Project is to repair and lengthen the damaged breakwater. The construction plan for the project is under final review and construction is expected to commence in 2003. The project is expected to last two to three years (Personal communication with ACOE, March 2002).

As the discussion above suggests, one of the major components of this project will be the acquisition of "armor stones" to shore up the breakwater. While Lana'i is not the only source for these stones, it is the most likely source given low transport prices for the stones and other factors. The landowner on Lana'i already operates a quarry on the island, but its supply is nearly exhausted and the establishment of a new quarry has been under consideration for some time. In anticipation of forthcoming ACOE demand for armor stones, the landowner is streamlining its evaluation of new quarry sites in anticipation of serving the ACOE's needs on the harbor project. One of the sites under serious consideration for the quarry site is an area in Unit F. While this is not the only site under consideration, for purposes of exploring potential costs this analysis assumes that the Unit F site is indeed the one selected for the new quarry.

Importantly, while this quarry would potentially supply the ACOE project, it would also be supplying other buyers. Sufficient demand for a new quarry already exists even without prospective demand from ACOE. That is, the landowner would <u>not</u> be developing the quarry under the auspices of the ACOE. As a result, there is no *Federal involvement* associated with the quarry <u>development</u>. However, the ACOE may nonetheless elect to consult on its <u>use</u> of the quarry (i.e., the acquisition

of armor stones). (Note that the harbor project itself is located outside of critical habitat, and therefore the placement of these stones by the ACOE would not affect critical habitat).

3.e.(2) Economic Impact on the Kaumalapau Harbor Navigation Improvement Project

Potential Project or Activity, next ten Years: Acquiring armor stones from a new quarry in Unit F for the Kaumalapau Harbor Navigation Improvement Project.

Federal Involvement: U.S. Army Corps of Engineers as the Action agency

Presence of Other Listed Species: None

Future Consultation Cost:

In the event that the landowner establishes a quarry in Unit F, ACOE may elect to consult with the Service regarding the acquisition of armor stones from the quarry for the purpose of breakwater construction in Kaumalapau Harbor.

- Total Section 7 Cost: $14,000

The estimate of cost is based on the following: (1) a consultation on a Federal project, (2) "Low" cost from Table VI-1 of a consultation with a Federal Action agency, and (3) a biological survey of a 100-acre, forested area with "Easy" accessability.

- Costs Attributable to Critical Habitat: $14,000

Since no listed plants are known to exist in Unit F, ACOE would not have consulted absent critical habitat designation. Therefore, cost associated with the consultation is solely attributable to the designation of critical habitat.

Anticipated Project Modification and Cost: Minor

Likely project modifications would involve obtaining the stones from another location within the quarry. As a result, the project modification cost is likely to be minor.

4. INDIRECT COSTS

4.a Introduction

Aside from the protection provided by the Act as described in Chapter III, the Act does not provide other forms of protection that apply directly to lands designated as critical habitat. Because consultation under section 7 only applies to activities that have *Federal involvement*, the designation

of critical habitat does not afford any additional protections for listed species with respect to strictly private activities.

However, designation of critical habitat may have indirect impacts beyond those associated with the Act. For example, designation may provide the impetus for the State and counties to require additional protections for designated critical habitat that would not otherwise be subject to such protections. These protections may affect both the management of affected lands as well as State and county development approvals. Also, the critical habitat designations may affect property values. These and other indirect impacts are addressed below.

4.b Management of Game Mammals and Loss of Hunting Lands

4.b.(1) The Game-Management Issue

One of the major issues surrounding the proposed critical habitat designations concerns the management of game-mammal populations (i.e., axis deer and mouflon sheep) and the potential loss of valued hunting lands. This is a highly sensitive issue not only on Lana'i but also throughout the State that for decades has been debated among environmental groups, hunters, biologists and government agencies. The concern does not generally extend to game birds in Lana'i, however, since the Service currently believes that game birds and the hunting of them do not have a significant adverse impact on listed species or their habitats.

As discussed in the proposed rule, the major threat to the survival and conservation of Hawai'i's native plants comes from ungulates, combined with competition from non-native plants. Ungulates feed on the succulent seedlings, stems and roots of various native plants; trample native groundcover and uproot seedlings and other low-growing plants; and create openings and sites where invasive non-native plants can become established and spread. Finally, ungulates carry seeds of non-native weedy and invasive plants in and on their bodies, thereby distributing invasive plants to new areas, especially along trails, in and around wallows, and in areas that have been rooted up or grazed. Many invasive non-native plants are able to colonize newly disturbed areas more quickly and effectively than can the native plants.

Furthermore, the Service believes conservation goals for endangered Hawaiian plant species cannot be achieved when feral ungulates are present in "essential habitat areas." Ranked in order of importance, the first of 13 recommended management actions needed to assure the survival and conservation of Hawai'i's endangered plants is "feral ungulate control." Consistent with this finding, the Service opposes land management that allows or enhances the free ranging of large populations of feral ungulates in areas having vulnerable plant species.

Measures to control feral ungulates in protected areas typically include strategic fencing, or barrier fencing, to prevent or limit their migration into designated areas; exclosure fencing to prevent ungulates from entering protected areas; organized hunting to remove them from protected areas;

and monitoring ungulate activity so land managers can direct hunters to problem areas. If increased hunting pressure does not reduce feral ungulate activity, land managers may work with hunters to identify and implement alternative methods, which may include trapping in remote areas. All of these activities may reduce the number of game mammals available to hunters and the sizes of hunting areas.

On Lana'i, approximately 2,500 hunters, mostly from Hawaiian islands other than Lana'i, participate in public game mammal hunts every year (Letter to the Service from DLNR. March 15, 2002). While many hunters accept the need to protect limited portions of the native forest from damage by ungulates, the majority of hunters strongly oppose removing game mammals from large portions of existing hunting areas. Furthermore, many hunters fear that critical habitat designation will lead to a loss of prized hunting areas as was the case with the court-ordered eradication of sheep and goats from the *Palila* critical habitat on the Island of Hawai'i 20 years ago (see Appendix VI-A which has more information on the *Palila* decision). Instead, most hunters advocate that game mammal populations continue to be sustained at levels that are sufficient to allow recreational and subsistence hunting in all but possibly a few of the existing State Hunting Units. They also see themselves as important contributors to controlling feral ungulate populations at reasonable levels and at little cost to the taxpayer.

4.b.(2) Indirect Impacts on Game Management

Section 7(b)(2) of the Act by itself does not require DLNR to manage State hunting lands to protect critical habitat; assure the survival and conservation of listed species; or participate in projects to recover species for which critical habitat has been established. That is, critical habitat designation does not require (1) creating any reserve, refuge, or wilderness areas; (2) fencing for any reason; (3) removing ungulates; or (4) closing areas to hunters. Instead, it requires only that, if DLNR seeks to undertake activities that may affect the designated area using Federal funding or with a Federal permit, the Federal Action agency must consult with the Service. Furthermore, DLNR can use Federal Pittman-Robertson funds to selectively fund game-management projects that do not affect critical habitat, thereby obviating the need for consultations on game management in these areas.

Nevertheless, critical habitat designation would add weight to the argument that game-mammal populations should be eliminated or reduced substantially in affected areas because they threaten Hawai'i's native plants. In turn, DLNR may elect to change its game-management strategies to reflect this shift in priorities.

4.b.(3) Indirect Impacts on Hunting Conditioned on a Change in Game Management

Assuming, for the sake of illustration, that DLNR builds exclosure fences around the proposed critical habitat units within State-managed hunting units, then the following impacts relating to hunting can be expected.

Hunting Activity

Once exclosure fences are built, approximately 4,747 acres–i.e. 16 percent of State-managed hunting units– will be eliminated from available hunting area. As a result, DLNR is likely to reduce the number of licenses by 16 percent, or 400 licenses (2,500*.16).

Since Lana'i has approximately 30,000 acres of privately managed hunting land, for the sake of illustration, this analysis assumes that about half of the 400 displaced hunters might simply switch to hunting on privately managed land. The other half might choose to hunt off Lana'i or switch to other pursuits, most likely on other islands.

Economic Activity

Assuming that half of the 400 displaced hunters remain in Lana'i and the other half leave for other islands, then hunting activity on Lana'i would drop by about eight percent (half of 16 percent). This translates into a decrease in economic activity related to hunting on Lana'i of about $104,000 in direct sales (8 percent of $1.3 million); $192,000 in total direct and indirect sales (8 percent of $2.4 million); four jobs (8 percent of 45 jobs); and $80,000 in income (8 percent of $1 million). Total economic activity related to hunting on Lana'i is documented in Appendix VI-A.

In addition, it is important to note that many of the affected businesses are small, and as a result, the impact may disproportionately affect small enterprises.

Benefits to Hunters

In addition to the change in economic activity discussed above, a reduction in hunting activity would also result in a loss in value or benefit to hunters (consumers' surplus)—see Appendix VI-A for the total benefits related to hunting on Lana'i. Under the given assumptions, this loss is estimated at $40,000 (8 percent of the current $500,000 in surplus value). But partially offsetting this loss to hunters would be benefits derived from recreational activities that replace game-mammal hunting.

Pittman-Robertson Funding

In some states, a reduction in the number of licensed hunters could reduce the amount of Federal Pittman-Robertson funding the State receives. The reason for this is that the formula used to calculated the distribution of funds is based in part on the number of licensed hunters. However, Hawai'i currently receives the minimum amount of funding in relation to the number of hunters.

Thus, any drop in the number of hunters would have no effect on the amount of funding Hawai'i receives. Furthermore, if a Pittman-Robertson project is denied by the Service, or DLNR

decides not to proceed with a proposed project, the associated Pittman-Robertson funds would not be lost. Instead, DLNR could use the funds to support another wildlife management project.

4.b.(4) Probability of a Change in Game Management

The above outcome would occur only if the State were unilaterally to adopt a new policy to eliminate game-mammal populations in critical habitat units that overlap with State Hunting Units. However, the probability is slight that the State unilaterally would adopt such policy. This projection is based on discussions with DLNR, others familiar with the subject, and decades of public testimony by hunters. Simply put, the scenario is not regarded as politically realistic: hunters would vigorously oppose a proposed reduction in game populations.

4.b.(5) Net Economic Impact

In summary, the probability of a major change in game management in Hawai'i is regarded as slight, even though the proposed critical habitat designation would add weight to the argument that game-mammal populations should be reduced substantially in affected areas. Thus, designation of critical habitat is expected to have minor economic impacts related to management of game mammals and to hunting.

4.c. Conservation Management

In previous critical habitat designations, private landowners have expressed concern that they will be required to alter the management of their lands that fall within the designation so as to assure the survival and conservation of listed species, regardless of whether they plan to propose any changes to land uses or activities in the future. Specifically, some have expressed concern that this new obligation will be expensive and they will have to pay most or all of any costs that may be associated with managing the land to assure survival and conservation of the species. Discussed below are the existing and potential obligations under the Act associated with this type of land management, management activities that would enhance the survival and conservation of listed plants, and the costs of such management activities.

4.c.(1) Requirements for Conservation Land Management

Existing Federal Requirements

Section 7(b)(2) of the Act by itself does not require landowners to manage their lands to protect critical habitat, assure the survival and conservation of listed species, or participate in projects to recover species for which critical habitat has been established. That is, critical habitat designation, by itself, does not require any landowner to: (1) create any reserve, refuge, or wilderness areas; (2) fence for any reason; (3) remove ungulates, rodents, or weeds; (4) close areas to hunters or hikers; (5) initiate conservation projects; or (6) prepare special land-management plans.

Instead, it requires only that a Federal agency that provides funding or permits for any activity that may affect the designated area must consult with the Service. Moreover, designation can help the landowner identify areas that would benefit from additional conservation land management.

Existing State Requirements

Under existing State law, a Federal designation of critical habitat would not subject the land to any additional State requirements. In fact, Hawai'i's endangered species law (Hawai'i Revised Statutes, Chapter 195D [HRS, 195D]), does not include or even mention "critical habitat."

Potential Requirements: Court Ruling on *Taking*

Even though there is no direct requirement under Federal or State law to proactively manage lands to protect listed species and their habitats, some landowners speculate that, pursuant to litigation, a Federal or State court could mandate conservation management of privately owned critical habitat. The legal decision would be based on an interplay among the Act, the State's endangered species law, and various State laws and State Administrative Rules that protect the ecosystems of threatened and endangered species (see Chapter IV for more detail on these State requirements).

Under State law, prohibited activities include the *taking* of any native threatened or endangered plant (Chapter IV). If a court finds that an action degrades a critical habitat, then landowners foresee that this action could be viewed as "injury" to the plant, regardless of whether the individual plant would be harmed directly by the proposed action (i.e., the action could harm a portion of the habitat of a listed plant, but not the plant itself). In turn, this "injury" to the habitat could be viewed as an illegal *taking* of the plant. Under State law, all projects and activities could be covered, regardless of *Federal involvement*. For example, allowing ungulates to roam free could be viewed as an activity that degrades a critical habitat and therefore amounts to a *taking* of a listed species. This argument is similar to the one that was used successfully in Federal court to order the eradication of sheep and goats on Mauna Kea to protect the critical habitat of the endangered *Palila*

bird (discussed in the appendix to this chapter, Appendix VI-A). In that case, the population of sheep and goats was actively managed by DLNR for the purpose of game hunting.

Under Federal law, the prohibition on *taking* in the Act applies to fish and wildlife, but not to plants outside areas under Federal jurisdiction. Nevertheless, section 9(a)(2) of the Act makes it unlawful to "remove, cut, dig up, or damage or destroy any such (listed plant) species on any [land outside Federal jurisdiction] in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law." Since the *taking* of listed species in Hawai'i is unlawful under State law, it is therefore unlawful under Federal law (23(3): 307-320). As a result, in Hawai'i, the Act's prohibition against *taking* applies not only to fish and wildlife, but also to listed plants.

Application to Critical Habitat

As noted above, even without the proposed critical habitat designation, the precedent set in the *palila* case already looms as a potential requirement for private landowners. For example, in a case brought under the Act, a court might mandate conservation management of privately owned land in existing habitat and/or Federally-designated critical habitat based on the argument presented in the *palila* case. For this situation, the effect of the proposed critical habitat designation could be to expand and define more precisely the geographic extent of habitat that could be the subject of such a court decision.

In the event that a case is brought under State law, landowners speculate that State agencies or a State court might interpret various State Administrative Rules and State laws that protect "ecosystems" of threatened and endangered species to mean protection of the "critical habitat" of these species–even though "critical habitat" is not mentioned in State laws. As a result, the proposed critical habitat designation could expand and define more precisely the areas that might be affected by State court rulings.

4.c.(2) Conservation Management to Protect Listed Plants

As indicated in the proposed rule, the major threats to native plants come from ungulates, combined with competition from non-native plants. In response to these and other threats, management actions needed to assure the survival and conservation of Hawai'i's listed species include: (1) feral ungulate control (e.g., strategic or barrier fencing to prevent or limit ungulates from migrating into large protected areas, exclosure fencing to prevent them from entering an area, extensive hunting and trapping to remove them from protected areas, one-way gates that allow animals to leave but not to enter an area, and monitoring transects for the presence of ungulates); (2) non-native plant control; (3) rodent control; (4) invertebrate pest control; (5) fire management; (6) maintenance of genetic material of the endangered and threatened plant species; (7) propagation, reintroduction and/or augmentation of existing populations into areas deemed essential for the conservation of species; (8) ongoing management of the wild, outplanted and augmented

populations; and (9) habitat management and restoration in areas deemed essential for the conservation of species.

4.c.(3) Costs of Conservation Management Activities

The cost of implementing the above management actions would depend on the circumstances: the size of the area being managed, its location and access, the terrain, the quality of the native vegetation, ungulate populations, the extent of weeds, the risk of fire, land-management goals, etc. Depending upon the circumstances, annual conservation-management costs range from an average of less than $30 per acre to more than $80 per acre (based on information from DLNR, the National Park Service, and private organizations). These figures are based on managing large, contiguous areas in the mountains; per-acre costs for managing small, dispersed areas could be significantly higher.

In addition to land-management costs, conservation of endangered plants (i.e., propagation, reintroduction and/or augmentation, fencing to protect from ungulates, monitoring, etc.) can be expensive. For example, a 5-year effort to plant 25,000 silversword on Mauna Loa and Mauna Kea on the Big Island, which is regarded as being relatively straightforward and does not require weed control, is estimated at $1 million (estimate provided by DLNR, 2001).

Government cost-sharing programs are available to fund conservation projects (see Chapter IV), but current funding is inadequate to support such projects for all the lands in Hawai'i that are being proposed for critical habitat.

4.c.(4) Potential Cost of Conservation Land-Management Due to Critical Habitat

In summary, an undetermined probability exists that a Federal or State court could mandate conservation management of critical habitat based on the interplay between the Act and State requirements. However, it is beyond the scope of this economic analysis to assess the legal merits of the above arguments, or the probability that one or more lawsuits would be filed and, if filed, to identify possible outcomes of a court decision and the associated probabilities.

But for the purpose of developing a conservative estimate of the potential cost of the proposed critical habitat designation, this analysis assumes that conservation management is mandated. This analysis also assumes that the conservation management is mandated for all of the proposed critical habitat that are in the mountains of Lana'i–approximately 10,000 acres (50 percent of the proposed critical habitat) since valuable natural resources such as watersheds and rare species tend to be concentrated in those areas. Under such a circumstance, the critical habitat proposal could cost the landowner on Lana'i $300,000 to $800,000 per year (based on $30 to $80 per acre). However, to the extent that parts of the mountainous areas in Lana'i are already under conservation management, this may overstate the estimate.

4.d. State and County Development Approvals

4.d.(1) Concerns about Development Approvals

As discussed below, a major concern of Lana'i's primary landowner, who is also the only significant developer of the island, is that critical habitat designations will significantly affect State and county development approvals, even when there is no *Federal involvement*. This landowner is concerned that areas designated as critical habitat will be interpreted by government officials as "environmentally sensitive," and that this will result in increased difficulty in securing development approvals. The argument against approvals would be that critical habitat must be protected, and development should be limited or not allowed within critical habitat boundaries.

Related concerns are that critical habitat will result in more expensive environmental studies, delayed projects, costly project modifications, increased risks of projects being denied and, for projects that are approved, the possibility of high legal fees to fight lawsuits designed to prevent or substantially alter projects.

The primary focus of the concern lies with potentially controversial projects that: (1) are in portions of the critical habitat that were not previously recognized as being environmentally sensitive because they contain no listed species, and (2) require major funding or discretionary approvals by the State or county. Discretionary approvals could include redistricting by the State Land Use Commission, approvals by the Board of Land and Natural Resources for projects in the State's Conservation District, General Plan or Community Plan amendments by county councils, etc.

4.d.(2) State and County Environmental Review

Based on discussions with planning consultants and government officials, critical habitat designations are likely to increase the level of environmental analysis. The reason for this is that State and county agencies would require developers to address the impact of projects on critical habitat and related public concerns.

Subject to certain exemptions, a State Environmental Assessment (EA) or Environmental Impact Statement (EIS) is required for projects that: (1) use State or county lands or funds; (2) are in the Conservation District; (3) are in the Shoreline Setback Area (usually 40 feet inland from the certified shoreline); (4) require an amendment to a county plan that would designate land to some category other than Agriculture, Conservation or preservation; or (5) involve reclassification of State Conservation District lands. If a project "substantially affects a rare, threatened, or endangered species, or its habitat," then a State EIS might be required instead of the simpler and less expensive EA.

It is reasonable to assume that, although State law does not include the concept of critical habitat, the term "habitat" (which, in Hawai'i, includes areas that support listed threatened and endangered species) may eventually be interpreted by decision-makers to include "critical habitat" (which may include areas that could support listed species but presently do not). Those arguing in favor of this interpretation would include environmental groups, those who may oppose development, and possibly some government agencies. Eventually a developer may elect to, or be required to, submit a State EIS based on the fact that a project is located in a critical habitat. Once the precedent is set, succeeding developers may be required to submit State EISs under similar circumstances. Furthermore, a court may interpret "habitat" to include "critical habitat."

If critical habitat designation results in a requirement for a State EIS instead of an EA then, depending upon the complexity of the project, this could cost $25,000 to $75,000 more than an EA (based on estimates from Hawai'i planning firms, 2002). Also, preparing and processing a State EIS would take about two months longer than an EA. In addition, biological surveys could be required.

4.d.(3) Project Modification

If a proposed project requires major State or county approvals and is within critical habitat, developers are likely to be required by State and county agencies to request comments from the Service on the project. If the Service indicates that the project would have a negative impact on the habitat of listed species, then State and county agencies probably would require project mitigation to address Service concerns. This would be expected even with no *Federal involvement*. The cost of the mitigation would depend upon the circumstances.

4.d.(4) Affected Projects and Increased Costs

The major Lana'i developer is planning to build a new quarry, and one of the possible sites being evaluated for the quarry overlaps with the proposed critical habitat (Unit F). A small part of this unit is in the Conservation District and the rest in the Agricultural District. As discussed above, this quarry project may require a State EA or EIS if the project site falls on the Conservation District. Because of the proposed critical habitat, however, a State EIS might be required instead of the simpler and less expensive EA. Furthermore, the State and/or county may request comments from the Service on the project. Although Unit F is *unoccupied*, the Service is likely to indicate that the project may have a negative impact on the habitat. As a result, the State and/or county may require project mitigation that is more stringent and costly than if the critical habitat were not designated.

As noted earlier in Chapter I, Section 2.b., the major development area in unit G will not be included in the final designation. Although a small number of Rural acres are included in the proposed critical habitat, the landowner does not have specific development plans for these areas for the next ten years. As such, no maps, permit applications, or other documents are available to serve as the basis for an estimate of possible impact of the proposed designation. Therefore, within the scope of this analysis, the possible quarry project discussed above is the only affected project.

4.e. Reduced Property Values

4.e.(1) General Factors Underlying Reduced Property Values

An issue often raised by private landowners is that their property may lose value with critical habitat designation. They are concerned that the designation will make their land less desirable by restricting its potential use or its development potential, or by increasing landowners' land-management or development costs.

Reduced property values need not be based in fact. Perceptions of the economic impact of critical habitat designation can result in a temporary loss in property value if landowners or buyers believe that the designation will restrict land uses, require modifications to the property, or cause project delays or other problems. Such a loss in property value can be experienced for as long as the perceptions persist.

Similarly, uncertainty about the impact of a critical habitat designation can cause a temporary reduction in land value that will continue until clear and correct information is distributed. To reduce the uncertainties, landowners may feel it necessary to retain counsel, land surveyors, biologists, and other experts to determine the implications of the designation on their property. This can be particularly important for landowners who plan to sell their property and so must address concerns of potential buyers.

4.e.(2) Potentially Affected Properties and Impacts on Property Values

The concern of landowners about reduced property values primarily involves land that is: (1) privately owned; (2) in the State's Urban, Rural or Agricultural District; and (3) suitable for eventual development or commercial use based on access, gentle slopes, proximity to infrastructure and services, etc.

However, only a few such properties are proposed for plant critical habitat designation. As noted in Chapter I, Section 2, much of the acreage that is in the Urban, and Rural Districts does not contain the *primary constituent elements* and is therefore excluded from the critical habitat designation. Most of the remaining land is: (1) in the Conservation District; and (2) not suitable for development due to poor access and difficult terrain.

After considering the above adjustments, privately-owned Agricultural land proposed for critical habitat includes the following: about 4,215 acres in Unit D, 366 acres in Unit E, and 753 acres in Unit F (see Table I-1). Many of these parcels are in remote areas, and much of the Agricultural land in Unit D is categorized as "Open Space" by the county to limit development. Therefore, any reduction in property value is expected to be small.

Approximately 110 acres of Rural lands are also included in Units D and G of the proposed critical habitat. As noted before, there are no definite plans for development in these areas right now. Furthermore, development in these rural lands are already limited by the county designation of the lands as "Open Space." However, although no access road exists, Rural land in Unit G is ocean-front and near where active resort and luxury home development is taking place. Rural land in Unit D is also near the ocean and accessible by a paved road. The worst-case scenario—and one that is not expected over the long term—would be a perception among potential buyers that these Rural lands should be valued as if they were subject to the same restrictions as land in the Conservation District. Rural land in Lana'i is valued at approximately $44,000 per acre and land in the Conservation District at $80 per acre (based on GIS analysis of land value). In this case, the decrease in property value for the Rural lands could amount to approximately $4.8 million ((44,000-80)*110).[12] As noted above, this scenario is not expected to occur, and ensuring that clear and correct information is available to all potential buyers will further reduce the potential for such a scenario.

4.f. Costs to Investigate Implications of Critical Habitat

The private landowner may hire attorneys or use his own professional staff to investigate the implications of critical habitat designation on their property. The landowner may want to learn how the designation may affect (1) the use of his land (either through restrictions or new obligations), and (2) the value of his land.

- Total Section 7 Costs: $2,700 to $6,500

This cost is based on the following assumptions: (1) one landowner will investigate the implications of critical habitat; (2) the landowner and/or his attorneys or professional staff will spend about 15 to 25 hours on the investigation at rates of $150 to $200 per hour; and (3) Service staff will spend four to ten hours at $100 to $150 per hour responding to inquiries from this landowner.

- Cost Attributable to Critical Habitat: $2,700 to $6,500

[12]Because this is a worst case scenario that is not anticipated to occur, this estimate is not reported in the summary tables.

Since this cost is incurred by the landowner to reduce uncertainty about the impacts of the designation, it is attributable solely to critical habitat.

5. POTENTIAL IMPACTS ON SMALL ENTITIES

5.a. Regulatory Flexibility Act

Under the Regulatory Flexibility Act (RFA) (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

This analysis determines whether this critical habitat designation potentially affects a "substantial number" of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses likely to experience a "significant effect." While SBREFA does not explicitly define either "substantial number" or "significant effect,"[13] the Environmental Protection Agency and other Federal agencies have interpreted these terms to represent an impact on 20 percent or more of the small entities in any industry and an effect equal or greater than three percent or more of a business' annual revenues.[14] In both tests, this analysis conservatively examines the total estimated section 7 costs calculated in earlier sections of this report, including those impacts that may be "attributable co-extensively" with the listing of the species.

5.b. Impact on Small Entities

The RFA/SBREFA defines "small governmental jurisdiction" as the government of a city, county, town, school district, or special district with a population of less than 50,000. By this definition, Maui County is not a small governmental jurisdiction because its population was 128,100 in 2000. As indicated in Section 3 above, certain State agencies may be affected by the proposed

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[13] Regulatory Flexibility Act, 5 U.S.C. 601 et. seq.

[14]See U.S. Environmental Protection Agency, *Revised Interim Guidance for EPA Rulewriters: Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act*, March 29, 1999.

critical habitat designation—such as DLNR. However, for the purposes of the RFA, State governments are considered independent sovereigns, not small governments.

No primary projects or activities that might be affected by the proposed critical habitat are expected to affect small businesses. As mentioned earlier in this chapter, one developer on Lana'i, who is also the sole owner of almost the entire island, may be adversely affected by a decrease in property values. However, this is a company that received over $13.5 million in net income in 1999 (Lynch. February 7, 2000). It is therefore not considered to be a small business. Thus, the proposed critical habitat designation is not likely to affect small businesses on Lana'i.

Based on the above analysis, as defined by SBREFA, a significant economic impact on a substantial number of small entities will not result from the proposed critical habitat designation.

However, in the unlikely event that DLNR builds exclosure fences around the proposed critical habitat units and removes these areas from hunting, and also restricts the amount of hunting activity on the island, then small businesses on Lana'i that cater to hunters could be indirectly affected by the critical habitat designation (see Section 4.b.(3) above). Because there would be less hunting on Lana'i, Hawai'i hunters would divert some of their expenditures from hunting-related stores and services on Lana'i to providers of other goods and services on Lana'i or on other islands, resulting in an adverse economic impact to Lana'i's small business community.

6. SECTION 7-RELATED ECONOMIC BENEFITS

6.a. Introduction

Critical habitat designation is likely to provide some economic benefits to the region, as well as to society as a whole. These benefits fall into two categories. Direct benefits are those directly attributable to the activities associated with compliance with the habitat designation, while indirect benefits arise from preservation of threatened and endangered species and other environmental improvements encouraged by habitat designation. Direct and indirect economic benefits may be manifested in two ways: changes in regional economic activity and changes in social welfare.

Regional economic and social welfare measures represent alternate ways to view the benefits of critical habitat designation. Regional economic benefits refer to an increase in revenues or employment in a given area. Changes in regional economic activity are an important aspect of policy and project evaluation because the costs of certain actions may be more concentrated among regional residents than are the benefits. From a national perspective, however, increases in activity in the region reflect a redistribution of activity from another geographic area, not a net increase in national economic activity.

Social welfare benefits are measured by individuals' "willingness to pay." The sum of an individual’s willingness to pay for something, less the costs associated with its consumption, is

referred to as consumer surplus. Consumer surplus is the standard metric used to evaluate alternate allocations of society's resources, as in cost-benefit analysis of environmental programs. While one might argue that local residents are the primary beneficiaries, to the extent that a critical habitat designation enhances the nation's stock of natural assets, the benefits associated with the designation flow to society at large.

However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Lana'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms. It is not intended to provide a comprehensive analysis of the benefits that could result from section 7 of the Act in general, or of critical habitat designation in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected costs of the rulemaking.

6.b. Direct Benefits

6.b.(1) Regional Economic Benefits

Regional Economic Activity Generated by Conservation Management

In FY 2001, the Service spent an estimated $35,000 on conservation management for listed plants in Lana'i, including expenditures on salaries, equipment, supplies and services. In turn, workers and companies that benefitted from the Services's expenditures on conservation management purchased additional goods and services, thereby generating additional economic activity (referred to as the multiplier effect). In total, the initial Service expenditure generated approximately $74,000 in direct and indirect sales for the year on Lana'i and other islands, and supported about one job in Hawai'i (based on multipliers from the Hawai'i Input-Output Model, DBEDT, 1998).[15] The State and other organizations also spend a considerable amount on

[15] The Hawai'i Input-Output Model is an economic forecasting tool that can be used to estimate the "ripple effect" of changes in regional expenditures. That is, as dollars are spent in or withdrawn from a particular sector of the economy, not only is that sector affected directly but also the other sectors that supply goods and services to it are affected indirectly. The magnitude of this

conservation management that involves listed plants in Lana'i (e.g., State expenditures to manage NARs).

If the proposed critical habitat results in an increase in conservation management activities in Lana'i, associated expenditures may increase economic activity in Hawai'i. Based on State multipliers, each additional $1 million spent in Hawai'i would generate approximately $2.1 million in direct and indirect sales in Hawai'i, and would support approximately 35 direct and indirect jobs. Thus, if all of the 10,000 acres of mountainous land in Lana'i that is proposed for critical habitat designation were to be managed at an average cost of $30 to $80 per acre (which is not expected unless mandated by a court order), then the resulting expenditure of about $300,000 to $800,000 per year would generate roughly $630,000 to $1.68 million per year in direct and indirect sales in Hawai'i, and would support about 11 to 28 direct and indirect jobs. However, to the extent that these areas are already under conservation management, these may overstate the actual estimates.

It is important to note, however, that expansion of Hawai'i's economy through these expenditures is contingent upon how they are financed. If the increase in conservation management is financed by an influx of new funds from outside the State, then the increase in expenditures will contribute to increased economic activity in Hawai'i. New funding for conservation management could come from the Federal government, grants from non-profit organizations outside Hawai'i, or other sources. While this is possible, no known projections are available that indicate a significant increase in funding for conservation management from outside Hawai'i due to the proposed critical habitat designation.

If increased expenditures on conservation management are funded from within Hawai'i, or through funds from outside sources already intended for use in the state, there would be no significant change in economic activity. Similarly, as discussed in the introduction, increased funding of conservation programs in Hawai'i would result in no significant change in economic activity for the national economy as a whole because any funds spent in Hawai'i would be at the expense of expenditures elsewhere (e.g., funds diverted from some other Federal program).

Regional Economic Activity Associated with Ecotourism

Commercial ecotours via foot hikes, mountain bike, and 4-wheel drive vehicle and led by guides featuring Lana'i's unique environment and vistas, are offered in portions of the proposed

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"ripple effect" is captured by estimates known as "multipliers". For example, a multiplier of two indicates that $1 worth of expenditures in a particular sector is responsible for an overall contribution of $2 to the local economy. It is important to note that "direct" and "indirect" in the context of input-output modeling refer to primary and secondary changes in sales and employment associated with expenditures. They do not, in this context, distinguish direct from indirect costs or benefits, as discussed in the introduction.

critical habitat Unit D around the summit area of Lana'ihale. Tours are also conducted down mountain trails and roads that end at overlooks and isolated beaches. Designation could benefit these operations by providing a marketing dimension that enhances the appeal of the hiking tours to visitors. However, this benefit is expected to be slight inasmuch as the summit area, included in Unit D, is already regarded as being special because it includes the highest spot on the island; has a view of other islands; contains the popular Munro Trail; and offers other attractions. In addition, in most if not all cases, the Service prefers that these commercial operations do not feature visits to view threatened and endangered plants since revealing their locations increases the risk that a species may be collected or damaged or its habitat harmed.

Regional Economic Activity Associated with Avoided Costs to Developers

The main advantage to developers of critical habitat designations is to provide them with more information regarding project siting. For example, knowledge of critical habitat boundaries can help developers avoid facing issues related to listed species. In the future, this may reduce delays and resultant revenue impacts associated with project modifications.

6.b.(2) Social Welfare Benefits of Habitat Designation

Critical habitat designation could also generate direct social welfare benefits. For example, economic literature has demonstrated individuals' willingness-to-pay for preservation of open space, both in general, as well as specifically in the vicinity of their residence. Similarly, a survey sponsored by the Trust for Public Land and conducted in April 2000, revealed the approximate amount that Maui County voters were willing to pay to better protect open space, wildlife habitats, recreational areas, and land around rivers and streams. According to the survey, approximately 66 percent of the voters would support a "community lands and open space preservation fund" to protect land and water in Maui County, and funded by a 2.5-percent increase in the property tax. This works out to a total of about $1.38 million per year (based on estimated property-tax revenues of $83.4 million in FY 2000 x 2.5 percent x 66 percent), or an average of about $11 per resident per year (based on a county population of 128,100 in 2000). Thus, to the extent that designation results in preservation of open lands that might otherwise be developed, some welfare benefits may be created. However, the proposed critical habitat is already kept as open space. As such, these benefits are likely to be insignificant.

6.c. Indirect Benefits

6.c.(1) Social Welfare Benefits of Endangered Species Preservation

The primary purpose of critical habitat is to protect areas that are needed to conserve threatened and endangered species. Many economic studies have demonstrated social welfare benefits associated with the conservation and recovery of endangered and threatened species (e.g., Bishop 1978 and 1980; Brookshire and Eubanks, 1983; Boyle and Bishop, 1986; Hageman, 1985;

Samples *et al*., 1986; Stoll and Johnson, 1984). Most research in this area has focused on mammals, birds, and fish. Depending upon the species, this literature indicates that households are willing to pay between $6 and $70 per year for species conservation, or one-time payments up to $216 (bald eagle, Loomis and White, 1996). These values may be motivated by expectations of future viewing opportunities, or a desire to preserve important natural resources for future generations.

Willingness-to-pay for a single species of endangered plant is likely to be lower than these amounts, particularly if the species is not well known to the general public. Few studies have focused on the value of preserving endangered plants and, given the scope of this analysis, no primary economic research was conducted on the value of species preservation. It is important to note, however, that some of these plant species have particular significance in an ethnobotanical context; that is, they are found in historical plant lore and in the agricultural customs of native Hawaiians.

However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Lana'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms.

Some landowners have argued that critical habitat would make little or no contribution to the ultimate conservation of Hawai'i's threatened and endangered plants. They observe that many of these native plants are vulnerable because they are weaker and more fragile than non-native plants, and they grow more slowly. In particular, native plants lack the natural defenses (e.g.,thorns, bitter tastes, offensive odors, etc.) to protect them from non-native pests (insects, diseases, rats, nematodes, birds, grazing animals, etc.), a vulnerability that reflects the fact that native plants evolved in isolation in a benign environment. Finally, many of the native plants cannot compete against aggressive fast-growing exotic plants, particularly when they are stressed, such as during droughts. In the long term, some argue that many listed plants will not be able to survive in the wild, with or without critical habitat designations. Nevertheless, critical habitat designations are mandated by law. And as long as these designations enhance the probability of the survival and conservation of listed species, regardless of how small that probability, critical habitat has value.

6.c.(2) Social Welfare Benefits of Broader Ecological Improvements

As discussed above, the survival and conservation of Hawai'i's native plants will require controlling feral ungulates. It is also recognized that ungulates cause additional environmental problems. Their browsing, digging, and trampling contribute to a loss of native habitat which, in turn, contributes to the loss of listed birds and other native birds, the endangered Hawaiian bat, and snails and insects that are either currently listed or are candidates for listing. Also, mosquitoes hatched in pig wallows frequently carry avian malaria and pox that contribute to the decline of native bird populations. Furthermore, certain ungulates (especially sheep and goats) can remove vegetation to such an extent that erosion becomes a major issue. In turn, the loss of vegetation can degrade watersheds, and the soil run-off can increase silt in streams thereby harming aquatic life; create layers of mud on otherwise sandy beaches; and bury near-shore reefs, thereby harming marine communities. Adverse impacts are more severe for bays and other protected marine environments that are not flushed by strong ocean currents.

In this manner, if feral ungulate control were undertaken for purposes of critical habitat, some complementary environmental improvements may be expected. These improvements may in turn improve ecosystem health and contribute to the welfare of residents and visitors. Similar to the benefits of species preservation discussed above, welfare benefits have also been ascribed to preservation of general biodiversity and ecosystem function (e.g., Pearce and Moran, 1994). However, determining the nature and extent of improvements specifically attributable to critical habitat designations would be difficult, if not impossible. For this reason, coupled with a lack of existing economic research, these potential broader ecological benefits are not quantified.

7. SUMMARY OF ECONOMIC IMPACTS

For economic activities affected by the proposed plant critical habitat in the next ten years, Table VI-3 summarizes the total section 7-related costs and benefits attributable to the plant listings, as well as those which are attributable solely to the proposed critical habitat designation.

These findings reflect the fact that very few new developments, commercial projects, land uses, and activities are expected in the eight proposed critical habitat units. This is due to (1) lands that are largely unsuitable for development and most other activities because of their rugged terrain, lack of access, and remote locations; and (2) existing land-use controls that severely limit development and most other activities in Lana'i. Also, a number of projects and activities in the proposed critical habitat would not be subject to section 7 consultation because there is no *Federal involvement*.

Thus, as shown in Table VI-3, the total section 7-related cost associated with the plant species listings is approximately $2.5 million, while the cost attributable solely to the critical habitat designation is approximately $2.2 million. In addition, indirect costs could add $4.8 million or more to the totals.

Designation of the proposed critical habitat and related actions taken to control threats to the plant species (e.g., ungulate control) may also generate economic benefits. These benefits may be related directly or indirectly to designation and manifest in increased regional economic activity or social welfare. For the former, to the extent that critical habitat designation leads to additional conservation management activities funded by out-of-state sources, a local increase in revenues and employment may result. For the latter, species preservation and recovery and other complementary ecological improvements may generate social welfare benefits for residents and non-residents alike. However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Lana'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms.

Table VI-3. Section 7-Related Costs and Benefits Attributable to the Plant Listing & Critical Habitat (10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH	
	Low	High	Low	High
DIRECT SECTION 7 COSTS				
Management of Game Hunting				
State-Managed Lands, Consultations	$ 30,000	$ 30,000	$ 28,000	$ 28,000
State-Managed Lands, PMs	$ 2,400,000	$ 2,400,000	$ 2,100,000	$ 2,100,000
Conservation Projects				
The Partners for Fish and Wildlife Programs/ Wildlife Habitat Incentive Program, Reinitiation of Consultations	$ 10,400	$ 10,400	$ 10,400	$ 10,400
The Partners for Fish and Wildlife Programs/ Wildlife Habitat Incentive Program, PM	None	None	None	None
U.S. Military Activities				
Aviation Training, Consultations	$ 3,800	$ 3,800	$ 3,800	$ 3,800
Aviation Training, PMs	None	None	None	None
Civil Works Program				
Kaumalapau Harbor Project, Consultations	$ 14,000	$ 14,000	$ 14,000	$ 14,000
Kaumalapau Harbor Project, PMs	Minor	Minor	Minor	Minor

Table VI-3. Section 7-Related Costs and Benefits Attributable to the Plant Listing & Critical Habitat (10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH	
	Low	High	Low	High
INDIRECT COSTS				
Management of Game Mammals and Loss of Hunting Lands	Minor	Minor	Minor	Minor
Conservation Management	Minor	Minor	Minor	Minor
State and County Development Approvals	Major	Major	Major	Major
Reduced Property Values	Major	Major	Major	Major
Investigate Implications of CH	$ 2,700	$ 6,500	$ 2,700	$ 6,500
Reduced Cooperation on Conservation Projects	Modest	Modest	Modest	Modest
DIRECT SECTION 7 BENEFITS				
Benefits of Project Modifications	ne	ne	ne	ne
Benefits to Developers	Minor	Minor	Minor	Minor
Ecotourism	Minor	Minor	Minor	Minor
INDIRECT BENEFITS				
Species Preservation	ne	ne	ne	ne
Ethnobotanical Benefits	ne	ne	ne	ne
Ecosystem Benefits	ne	ne	ne	ne
TOTAL				
Costs Over 10 Years	**$ 2,461,000**	**$ 2,465,000**	**$ 2,159,000**	**$ 2,163,000**
Benefits Over 10 Years	**ne**	**ne**	**ne**	**ne**

APPENDIX VI-A

Information on Hunting and Game-Mammal Management

1. INTRODUCTION

Presented below is background information on hunting on Lana'i and DLNR's game-mammal management. The material is used in Chapter VI in addressing direct and indirect economic impacts of critical habitat on game-mammal management. Subjects addressed include the following: hunting activity on Lana'i, economic activity associated with hunting, the value of hunting to hunters, DLNR game management, the loss of hunting areas to the *palila* critical habitat, information on the Pittman-Robertson Act, consultation with the Service on Pittman-Robertson projects, and recent changes in hunting fees.

2. HUNTING ACTIVITY ON LANA'I

Hunting is an important activity for Lana'i, because it provides recreation, subsistence, and a desired lifestyle for Lana'i residents. Also, hunting serves as a major attraction for the island. Of about 6,000 to 7,000 hunters applying for permission to hunt on Lana'i, only about nine to ten percent are local hunters and the rest are from other islands and/or the mainland (based on DLNR estimates, 2001).

Game mammals hunted on the island include axis deer and mouflon sheep. Game birds include ring-necked pheasant, Francolin (two species), chukar partridge, quail (three species), dove (two species) and wild turkey.

3. ECONOMIC ACTIVITY ASSOCIATED WITH HUNTING

In 1996, 23,000 hunters in Hawai'i, most of whom were local residents, spent an estimated 258,000 days and about $16.4 million on hunting, of which about $8 million was trip-related and about $8.4 million was for equipment and other expenses (1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation). Approximately 70 percent of their hunting trips were spent hunting game mammals and the remaining trips were for game birds. Based on DLNR's estimate, approximately 2,500 hunters, mostly from off-island, participate in the public hunting program in Lana'i (DLNR data, 2001). This population represents about 11 percent of the total number of State hunters and is comparable to about 78 percent of the island's population.

Companies that supply goods and services to hunters, and the employees of these companies, in turn purchase goods and services from other companies, thereby creating even more sales, and

so on. These "indirect" sales are scattered throughout the economy and the State. When both "direct" and "indirect" sales are included, total Statewide sales due to hunting in Hawai'i amounted to about $31.8 million in 1996. In turn, this economic activity supported an estimated 580 jobs and generated an estimated $13.5 million in income (an average of about $23,300 per job). These estimates are based on multipliers from the Hawai'i Input-Output Model (DBEDT, 1998).

In 1996, economic activity supported by just game-mammal hunting on Lana'i amounted to about $1.3 million in direct sales, $2.4 million in total direct and indirect sales, 45 jobs, and $1 million in income. These figures are order-of-magnitude estimates based on 70 percent of the hunting trips being spent hunting game mammals, and 11 percent of the State's hunting activity taking place on Lana'i.

4. VALUE OF HUNTING TO HUNTERS

The net value of hunting opportunities to hunters is based on what they would be willing to pay above and beyond their expenditures for hunting equipment, supplies, and travel to participate. "Consumer surplus" is the standard measure of value used in cost-benefit analyses. The Statewide value of all hunting for 1996 is estimated at $6.5 million, based on (1) the assumption that hunters value their experience at $25 per day; and (2) they hunted a total of 258,000 days that year. For Lana'i, the value of just game hunting amounted to about $500,000 ($6.5 million x 70 percent x 11 percent). These figures on the value of game hunting should be interpreted as order-of-magnitude estimates, not precise estimates.

The valuation of hunting at $25 per day is consistent with estimates of the valuation of hunting from the following economic studies:

- $19.18 or $26.86 per day for hunting deer in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Donnell and Nelson, 1986)

- $22.45 or $28.50 per day hunting for jack rabbits and game birds in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Young, et al., 1986)

- $21.66 or $24.44 per day for hunting pheasant in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Young, et al., 1986)

- $16.56 per day for hunting pheasant in Idaho in 1971 (Shulstad, 1978)

A valuation of hunting based on the market value of the meat harvested in excess of the hunters' expenditures on hunting (i.e., the subsistence value of hunting) would be lower. In effect,

hunting is largely a recreational pursuit for which expenditures on equipment and travel, and the value of the time spent hunting and butchering the animals, are partially offset by the value of the meat harvested.

5. DLNR GAME MANAGEMENT

DLNR is the State agency responsible for managing game-mammal populations in State Hunting Units. However, it must carry out this responsibility in the context of two conflicting mandates: provide for sustained-yield recreational hunting in some of the State Hunting Units and protect native ecosystems and plants in other areas.

DLNR achieves what they regard as a reasonable balance between the two mandates by permitting recreational hunting based on site conditions (e.g., animal population and food supply), and habitat quality (nearly pristine, highly degraded, or somewhere in between) (see Appendix VI-B). For example, the most liberal hunting (e.g., year-round pig hunting) is permitted in nearly pristine areas that have suffered the least environmental damage. This helps keep game-mammal populations low in these sensitive areas, thereby minimizing harm to native ecosystems and to endangered and threatened plants. However, hunting is not possible in many remote areas that are inaccessible to hunters.

In highly degraded areas where DLNR sees no hope that the vegetation will return to native forest, hunting is restricted in order to sustain larger populations of game mammals (see below for the methods used to restrict hunting). When hunting is restricted, the larger populations allow hunters to harvest more animals each year than would be the case with smaller populations. In addition to the recreational benefits to hunters of having higher game harvests, reasonable numbers of game mammals are available to browse on the non-native plants and weeds, thereby helping control the seed reservoir of noxious non-native plants and their spread into other areas.

Finally, in degraded areas, exclosure fencing of small areas (of less than 2 acres) may be used to protect rare native plants and their seeds from foraging animals. These exclosures are small enough to make it practical to weed the overgrowth of aggressive alien plants which would otherwise choke out the native plants or carry a wildfire.

According to DLNR, the combined strategy of using game mammals to help control non-native plants and weeds in degraded areas and using hunters to help control ungulate populations and their migration into more pristine areas can provide the resulting recreational benefits to hunters at little cost to the taxpayer.

However, it should be noted that experts question the effectiveness of DLNR's game-management approach in protecting native forests, arguing that so long as large populations of feral ungulates are free to range, they will migrate into areas that are not degraded, possibly because they are fleeing from hunters or searching for better forage than what they can find in degraded game-

production areas. In turn, their migration into these areas will contribute to the loss of listed plants and to the spread of noxious plants. Also, the State exclosures are regarded by the Service as too small to sustain viable populations of threatened and endangered plants (Personal communication with the Service, 2002).

The methods employed by DLNR to manage game-mammal populations take advantage of the fact that the demand for hunting opportunities exceeds the availability of game mammals. Within each State Hunting Unit, DLNR controls the amount of hunting activity by using such restrictions as: bag limits; hunting method (rifle, muzzleloader, bow and arrow, dogs and knives); days allowed (week-ends only); hunting seasons; hours of the day; and for some areas, a limit on the number of daily permits issued (Hawai'i Administrative Rule, Title 13, Chapter 123). However, hunting activity falls off if hunters' success rates are low (which usually occurs when too many hunters are after too few animals) or if certain areas are difficult to access/reach. Also, some of the hunting restrictions are for safety purposes: limiting the number of hunters prevents dangerous overcrowding and risks to both hunters and other recreational users in the area (e.g., hikers and campers).

If the game-mammal population surveys indicate that the number of animals is too high for an area, DLNR responds by allowing more hunting. But if DLNR believes that the increased hunting is not reducing the population sufficiently—possibly because of difficult access to a remote area—then DLNR may direct staff to remove the animals where economically feasible.

To provide guidance for adjusting the controls on hunting activity, DLNR monitors the following: (1) hunting activity (including the number of hunting trips, game harvests by type of game, and success rates); (2) game populations (using habitat transects, harvest data, hunter reports, and aerial and ground surveys); and (3) vegetation (including the coverage, composition by type of plant, invasion by non-native plants, trends, comparisons with vegetation inside animal exclosures, and impacts to plants from game mammals). But the management of game-mammal populations is not an exact science. For example, animal population estimates may be inaccurate; populations vary with rainfall and food availability; and animals move from one area to another.

6. LOSS OF HUNTING AREA DUE TO THE *PALILA* CRITICAL HABITAT

Based on past experience, most hunters in Hawai'i associate critical habitat designation with loss of prized hunting areas. Although a parallel situation does not exist with the proposed critical habitat on Lana'i, the association is based on the *palila* critical habitat on the Island of Hawai'i.

In 1975, the Service listed the *palila (Psittirostra bailleui),* a Hawaiian honeycreeper (a bird), as an endangered species. The *palila* depends entirely on the *mamane-naio* ecosystem—a broad band of sparse forest encircling Mauna Kea between about 7,000 and 10,000 feet of elevation. In 1977, in an effort to further protect the *palila*, the Service designated the *palila* critical habitat, encompassing about 67,000 acres (105 square miles) of hunting land.

The *palila* were at risk because sheep and goats on Mauna Kea browsed on the *mamane* trees in the *mamane-naio* ecosystem, which was very destructive to the *palila's* habitat. Starting in the late 1940s, the population of game mammals was allowed to increase on the mountain to allow sustained harvest by hunters. Even after the *palila* was listed as endangered and its critical habitat was designated, DLNR continued to manage the feral sheep and goat populations at sustainable levels for hunting, causing continued harm to the *palila's* habitat.

This situation led the Sierra Club Legal Defense Fund to file a lawsuit in Federal court, *Palila v. Hawaii Department of Land and Natural Resources,* to require DLNR to remove the feral sheep and goats from Mauna Kea. The case tested the prohibition in the Act on *taking* of any endangered species of fish or wildlife, where *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." At issue was whether modifying a habitat (i.e., in this case sheep browsing on *mamane* trees) may result in "harm" to a species thereby meeting the definition of "taking."

In 1979, a Federal court rendered an opinion in support of the plaintiff. Since studies showed clearly that the sheep and goats were "destroying or altering" the *palila* habitat, the court ordered DLNR to eradicate them from Mauna Kea and this was nearly achieved by 1981. The ruling did not affect the management of pigs on the mountain.

Following this case, the Service regulations defined "harm" to be "an act which actually kills or injures wildlife." The regulations further explain that "[s]uch act may include significant modifications where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Even though Hawai'i hunters associate critical habitat designation with eradicating game animals and loss of prized hunting areas, the eradication of sheep and goats from the *palila* critical habitat was based on the Federal *taking* provision of the Act and not on *adverse modification* to the critical habitat. Furthermore, under Federal law, a situation similar to the *palila* critical habitat would not apply to the critical habitat for plants since the Federal *taking* provision applies only to listed wildlife and not to plants. However, the State's endangered species act does have a *taking* provision for listed plants.

7. PITTMAN-ROBERTSON ACT

Game-management funding is provided as part of the Federal Aid in Wildlife Restoration Act, commonly referred to as the Pittman-Robertson Act. This Act was passed by Congress in 1937 to help restore the nation's wildlife following accumulated damage to forests and grasslands and extensive commercial harvesting of wildlife. Hawaii's local hunters help fund this program, since revenues for it are derived from an 11 percent Federal excise tax on the price of sporting arms, ammunition, and archery equipment, and a 10 percent tax on handguns. Each state's share of these revenues is determined by a formula that considers the total area of the state and the number of

licensed hunters in the state, subject to a minimum level of funding. Each state provides matching funds of at least 25 percent of the program costs from a non-Federal source. Also, each state specifies how the funds are to be spent, while the Service serves as an administrative check to insure that the funds are spent in compliance with the Act.

Because of its small area and population, Hawai'i receives the minimum level of Pittman-Robertson funding. For FY2001, total funding amounted to nearly $1.1 million, of which about $817,000 was Federally funded and about $272,000 was State-funded. The County of Maui received about $170,000 for its game-management program plus another $50,000 for non-game programs.

8. GAME MANAGEMENT CONSULTATION HISTORY

8.a. 1995 Pittman-Robertson Consultation

In March 1995, the Service conducted an internal consultation regarding Pittman-Robertson funding for a series of DLNR projects Statewide. The projects on Lana'i included installation of four miles of water line and construction of four game mammal and bird water units within the game management area. The Service determined that the proposed projects were not likely to adversely affect Federally listed endangered and threatened species and approved the projects without need for modification.

8.b. 2001 Pittman-Robertson Consultation

The 2001 Pittman-Robertson Statewide consultation required approximately one man-month of the Service's time, and 60 man-days of the State's time. Based on current salaries and benefit levels, administrative time, and overhead costs, the time spent in consultation cost the Service about $15,600 and the State about $12,000.

During consultation, the Service approved with some modification 65 of 67 game-management projects proposed by DLNR. The Service determined that the two remaining projects could adversely affect listed species. One concerned hunter check stations and game-mammal surveys on Kaua'i. In this case, the Service requested assurances from DLNR that information collected from check stations and surveys would not be used to maintain or enhance free-ranging game-mammal populations that could adversely affect Federally listed species. For all islands, except Kaua'i and Lana'i, DLNR provided the necessary assurances and the Service concluded that these projects were not likely to adversely affect listed species. For Kaua'i, DLNR chose to withdraw the project from consideration rather than (1) modify it to avoid adverse impacts to listed species, or (2) pursue a formal consultation.

The second exception concerned a portion of a project that involved leasing 30,000 acres on Lana'i for State-managed game hunting, maintenance of hunter check stations, maintenance of

game-mammal watering units, and game-mammal population surveys. Because the Service determined that funding the Lana'i portion of this project was likely to adversely affect listed species, the Service was unable to approve it as requested. Again, DLNR opted to withdraw the offending Lana'i portion of the project rather than (1) modify it to avoid adverse impacts to listed species, or (2) pursue a formal consultation. Modification could have involved expensive fencing to prevent game mammals from migrating into areas that support listed species.

For either or both of the two projects discussed above, DLNR could have pursued formal consultation with the Service with the possibility that they would have received a determination by the Service that the projects were not likely to *jeopardize* the continued existence of listed species and could be funded. But DLNR opted not to do so because: (1) time was too short to assemble needed information and complete the formal consultation; (2) the staff had to make fiscal and budgetary commitments; and (3) the outcome was uncertain.

Instead, DLNR elected to shift funding sources for its wildlife management projects: State monies were used to fund the Kaua'i and Lana'i projects mentioned above, and the remaining Pittman-Robertson funds were used for projects that were originally scheduled to be funded by the State (e.g., game-bird projects).[16] The net effect was no change in the amount of Pittman-Robertson funding provided to DLNR, and modest changes to the wildlife management projects themselves.

On Kauai, DLNR elected to drop a proposed helicopter goat survey project rather than fund it entirely with State monies. The helicopter services would have cost about $4,000.

The more significant changes in Maui and Hawai'i Counties involved some new fencing and lids to protect game-bird water stations from being used by game mammals in areas having listed plants—changes that (1) decreased game-mammal populations in the affected areas or required separate State-funded water stations for game mammals and (2) diverted Pittman-Robertson and State funds from other projects to pay for the additional fencing, lids, and new game-mammal water stations.

Critical habitat designations had no role in the above decisions, however, since critical habitat had not yet been designated. The consultation between DLNR and the Service on projects proposed for Pittman-Robertson funding, modifications that were made to projects to avoid adverse impacts, and DLNR's decisions to withdraw the Kaua'i and Lana'i projects and to shift funding sources among projects occurred entirely because of the presence of listed species in affected areas.

[16]DLNR is, however, planning to pursue Pittman-Robertson funding again for the Lana'i projects (discussed more in detail in Chapter VI, Section 3).

9. HUNTING FEES

In February 2002, the Board of Land and Natural Resources increased State hunting fees which are expected to increase revenues to the State by about $200,000 per year. The additional fees will give DLNR additional money and flexibility in funding game-management projects.

APPENDIX VI-B

Resource Management Guidelines

Department of Land and Natural Resources
Division of Forestry & Wildlife

"The basis of the Division of Forestry & Wildlife's (DOFAW's) Resource Management Guidelines is the status of the native vegetation in an area. The character of the vegetation is classified as: 'Most Pristine Native,' 'Native,' 'Considerably Disturbed,' or 'Badly Degraded or Highly Altered.' The vegetation status is then considered in conjunction with public safety, public demand for specific resources, and the effect of the proposed use on the vegetation.

Potential game management strategies have been divided into four categories, called Game Animal Management Classifications. These are:

— Game Production. Game is a primary objective. Areas are managed for public hunting on a sustained-yield basis. Habitat may be manipulated for the purpose of increasing or maintaining the game carrying capacity of the habitat. Hunting seasons and bag limits are set to provide sustained public hunting opportunities and benefits. Some of the Game Management Areas are in this class.

— Mixed Game and Other Uses. Production of game is an objective integrated with other uses such as hiking, production of forest products, and protection of native resources. Game populations are managed to acceptable levels using public hunting. Habitat manipulation for game enhancement may be conducted, but only when it is consistent with other uses. Seasons and bag limits are designed to ensure compatibility with other uses. These areas include portions of forest reserves and some Game Management Areas.

— Game Control. Protection of resources is the primary objective, with emphasis on native plant community and watershed protection. Hunting is used to reduce animal impacts to those resources. Bag limits or seasons are liberal. These areas include watershed areas, portions of forest reserves, Natural Area Reserves, and wilderness preserves.

— Staff Control. Areas designated for animal removal by staff or agency designees because of remoteness, environmental sensitivity, or public safety. Game mammal control is the objective. Control actions can include but are not limited to staff shooting or animal translocation. These areas include portions of forest reserves, Natural Area Reserves, wilderness reserves, and plant and wildlife sanctuaries.

Under DOFAW's Resource Management Guidelines, maintaining game bird populations is considered compatible with other uses in most areas. Game birds are managed for 'Game Production' or 'Mixed Game and Other Uses' in most areas.

Because of potential detrimental effects of game mammals on native ecosystems, management strategy for game mammals is more complex. Areas managed for game mammal production; i.e., 'Game Production,' are located primarily in areas classified as 'Badly Degraded or Highly Altered.' These areas have a preponderance of weedy species, contain very few native plants, and are managed to produce game animals for recreational hunting. Under this management approach, known individuals or populations of listed plants are fenced or otherwise protected from feral ungulates. Areas classified as 'Predominantly Native' and 'Considerably Disturbed' are managed as 'Mixed Game and Other Uses' for game mammals and have seasons and bag limits designed to ensure compatibility with other uses, including native ecosystem protection. Areas classified as 'Most Pristine Native' are managed for 'Game Control or Staff Control' and have the most liberal hunting seasons to minimize the pressure of feral animals on native ecosystems."

Hawai'i Department of Land and Natural Resources
Undated

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Information was provided in communications with representatives of:

Government

- Maui Chamber of Commerce
- County of Maui, Finance Department
- County of Maui, Planning Department
- County of Maui, Department of Land Use and Code Administration
- Hawai'i Department of Land and Natural Resources
- Hawai'i Department of Transportation
- Hawai'i Department of Public Works and Waste
- Department of Hawaiian Home Lands
- U.S. Department of Agriculture, Natural Resources Conservation Service
- U.S. Department of the Navy
- U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office
- U.S. Army Corps of Engineers
- U.S. National Park Service

Private

— Lana'i Company, Inc.
— Decision Analyst Hawai'i, Inc. (DAHI)
— Char & Associates

Non-profit

— Earthjustice Legal Defense Fund
— Hawai'i Agriculture Research Center
— Pacific Legal Foundation
— The Nature Conservancy of Hawai'i
— The Trust for Public Lands